



# Assessing the Impact of Kenya BDS and Horticulture Development Center Projects in the Tree Fruit Value Chain in Kenya

## Baseline Research Report

microREPORT #33

Don Snodgrass and Jennefer Sebstad  
2005

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## LIST OF ACRONYMS AND ABBREVIATIONS

AGOA	African Growth and Opportunity Act
BDS	Business Development Services
EAGA	East Africa Growers' Association
EPZ	Export Processing Zone
EU	European Union
EUREPGAP	Euro-Retailers Produce Good Agricultural Practices
FPEAK	Fresh Produce Exporters Association of Kenya
GOK	Government of Kenya
HCDA	Horticultural Crop Development Authority
HDC	Horticulture Development Centre (Fintrac)
HIV/AIDS	Human Immunodeficiency Virus/ Autoimmune Deficiency Syndrome
IR	Intermediate Result
KACE	Kenya Agricultural Commodities Exchange
KADI	Kamurugu Agricultural Development Initiatives
KARI	Kenya Agricultural Research Institute
KHE	Kenya Horticulture Exporters
Ksh	Kenya Shilling
KWETU	Swahili for "our home", name of a local non-governmental organization
MOA	Ministry of Agriculture
MOU	Memorandum of Understanding
MSEs	Micro and Small-Scale Enterprises
NGO	Non-Governmental Organization
SITE	Strengthening Informal Sector Training and Enterprise
SMS	Short Message Service
SO	Strategic Objective
USAID	United States Agency for International Development

# EXECUTIVE SUMMARY

## THE PROJECTS AND THE IMPACT ASSESSMENT

This study assesses<sup>1</sup> the impacts of two USAID/Kenya funded projects that focus on developing sustainable solutions to constraints facing businesses in targeted industries and the degree to which these solutions impact:

- the competitiveness of the mango, passion fruit, and avocado value chains;
- the integration of micro and small enterprises (farmers and others) into these value chains so that they contribute to and benefit from the tree fruit industry's increased competitiveness

The projects are the Kenya Business Development Services (BDS) project implemented by the Emerging Markets Group and Fintrac's Horticulture Development Centre (HDC) project. Both projects support USAID/Kenya's strategic objective of increasing rural household incomes in Kenya (SO 7). They seek to raise smallholder productivity, widen market outlets, facilitate vertical and horizontal linkages, and promote the sustainable development of business services for rural MSEs

Kenya BDS, a five-year project, started in 2002 and worked initially on the tree fruit value chain. In its first two years, the project issued tenders and awarded contracts to eight private sector and NGO partners. The contracts were designed to facilitate the development of sustainable solutions/services that provide material inputs (agro-chemicals and seed varieties), appropriate technology to upgrade products and production processes, business and skills training, and extension and information services.

Several contracts promote market linkages between smallholder producers and lead firm exporters through supply contracts and lead firm provision of embedded services, and encourage inter-firm cooperation through organization of producer groups and provision of embedded services.

The HDC project focuses on a wide range of horticulture products. We study only their passion fruit work, which includes plans to: (1) introduce new varieties of passion fruit for fresh export; (2) improve agricultural practices of local producers; (3) expand local processing capabilities for local market products; and (4) strengthen the farm-to-market value chain, inclusive of business services to small farmers. Unlike Kenya BDS, the HDC project does not operate through contracts but carries out activities directly through project staff based in Nairobi and agronomists based in four field offices. It works with and through cooperating partners, including KARI, existing smallholder associations, and two small businesses producing plant stock. In the future, it intends to work through input suppliers as well. This five-year project began in late 2003 and was in its first year of operation at the time of the baseline survey.

The study is longitudinal, with a baseline study including both quantitative and qualitative research. This will be followed up in two years with a resurvey of the same respondents as well as further qualitative research. The major findings on the impact of the two projects will emerge after this second stage of research.

This report presents the findings of a baseline study that featured a survey of 1,947 smallholder farmers who grow avocado, mangos, or passion fruit in

Central, Eastern, and Rift Valley provinces. The sample included farmers who are participating in the two projects as well as a control group of non-participants. The survey was complemented by qualitative research (in-depth interviews and focus group discussions) with over 60 individuals involved in the tree fruit value chain, including farmers, farmer producer group leaders, input suppliers, extension workers, brokers, exporters, and Kenya BDS and Fintrac project directors and staff.

The study design is based on a causal model of impact that shows how project facilitation activities to promote sustainable solutions can address constraints to smallholder participation and the competitiveness of the tree fruit value chain<sup>2</sup>. These activities in turn lead to sustained access to the solutions, smallholder upgrading, increased smallholder MSE profits from tree fruit activities, increased rural household incomes, and overall sector growth and competitiveness within the value chain.

The study tests three hypotheses about the impact of donor interventions in opening up opportunities for smallholder MSEs in local, regional, and global markets and in improving the competitiveness of the overall value chain:

**Hypothesis 1:** Project activities to promote sustainable solutions in the tree fruit value chain contribute to better integration of smallholder MSEs into the value chain.

<sup>1</sup> "Value chain" and "sub-sector" are used synonymously throughout this report.

<sup>2</sup> Sustainable solutions here refer to more than business services from third party providers - they also include sustainable access to markets, business relationships, TA provided in an embedded fashion from one firm to another, improved business environment, capacity of industry representatives to influence policy, etc.



**Hypothesis 2:** Better integration of smallholder MSEs into the tree fruit value chain contributes to enterprise upgrading, improved performance, and enhanced household well-being.

**Hypotheses 3** Greater integration of smallholder MSEs into productive value chains contributes to improved competitiveness and growth of the targeted value chains.

## FINDINGS OF THE BASELINE STUDY

### Tree Fruit Market

Avocados, mangos, and passion fruit are among the most common fruit crops in Kenya. Most of the fruit produced is sold in the domestic market, but all three fruits are important and growing export crops. In Europe, Kenyan fruit has a competitive advantage based not on volume, quality, or price, but rather on seasonality. Avocados, mangos, and passion fruit each have a 'window' when these crops are less available from other suppliers. Kenya is also better set up to meet certification standards than other countries.

The main marketing outlets for tree fruit producers are traders and brokers, who in turn sell to both domestic and export markets. In the domestic market, they sell to wholesalers, fresh fruit retailers, and small retail shops. Producers also sell directly to fresh fruit retailers and the Horticulture Crop Development Authority (HCDA). Brokers and traders are the main conduits for smallholders to formal and informal processing plants and to exporters who buy tree fruits. Medium-scale growers often link directly to processing plants, local supermarkets, and exporters. Exporters buy fruit produced by smallholders and medium-scale farmers and also produce some fruit on their own plantations.

Exporters have just recently begun to buy directly from producer groups and to provide embedded services to smallholders through these groups.

Constraints to smallholder participation in the tree fruit value chain include:

- Lack of information and knowledge of the markets
- Limited access to inputs
- Limited access to resources for, and/or weak incentives for, upgrading
- Weak vertical and horizontal linkages within the value chain
- Lack of trust among producers, brokers, and exporters

Governance in the tree fruit value chain is characterized by a mix of market and network relationships (see page \_\_\_\_ for more detail). Smallholders have traditionally sold their fruit to brokers on a spot basis; contractual relationships have been marked by distrust. With increasing concentration among European buyers and rising standards in end markets (especially Europe, but also in other international, regional, and domestic markets), the power of the retailing groups to impose governance rules on the value chain is increasing. Horizontal linkages in the form of farmers' associations exist but need strengthening. The horticulture value chain has had limited government involvement and private firms have generally been left free to organize the trade. This differs from the pattern that characterizes some other commodity value chains in Kenya -- for example, coffee, tea, and pyrethrum, for which official marketing boards still control procurement and prices. As producer groups form to link to inputs and markets, and as exporters form associations, the patterns are shifting more toward network relationships.

### Tree Fruit Enterprises

We surveyed five interventions intended to promote upgrading and raise productivity and income from tree fruit among

smallholder producers of avocado, mango, and passion fruit. The MSEs included in the survey cultivated varying numbers of trees/vines, with avocado holdings the smallest on average and passion fruit the largest. For each fruit, the range of holding sizes was wide. With one exception, production and productivity were higher for program participants than for controls, differences that may reflect selection bias and/or early impacts of program participation. Between the two passion fruit sites, Fintrac works with larger farmers.

Nearly all the farms surveyed sell tree fruit, primarily through traders of different sorts, but most earn only small amounts from these sales. Contract sales have become dominant and relatively well accepted for farmers selling avocados to EAGA under the Kenya BDS project and those selling passion fruit in the Fintrac areas; remaining groups sold their fruit predominantly in spot markets.

Hired labor was used fairly extensively by richer farmers, while poorer farmers relied primarily on family labor. Woman-managed farms tended to hire more labor than comparable farms managed by men.

Producer group membership was almost universal among program participants, both male and female. Moreover, nearly all of the farmers who belonged to producer groups characterized them as either very or fairly useful.

Few farmers had access to irrigation and less than one-half purchased fertilizer for use on their fruit trees. A larger number said they had bought pesticide or fungicide sprays.

Considerable numbers of respondents had instituted improved cultivation or marketing methods in the past two years. Large numbers in some areas had

planted fruit trees in the past year. Farmers looked to a wide range of sources for useful technical advice, information, or training.

### **Tree Fruit Households**

Household size in the sample is large relative to the total population, but about average for poor rural households. The number of earning members in households and the number of household income sources suggest an active working population among respondents. There are no major differences in earner-dependent ratios between men and women headed households or by wealth level (as indicated by asset scores), suggesting that this may not be a major determinant of vulnerability for households in the sample.

The asset scores and consumption expenditure data show a significant number of poor households in the sample, in both the participant and control groups. This suggests the projects are involving poor households and, thus, have potential for direct impact on their income from tree fruits. The sample also includes non-poor households, which should provide a good basis for comparing impacts across poverty groups at the end line.

Households are quite diversified in their sources of income and tree fruits are an important source. While these figures may reflect an upward bias in some respondents who associated the study with the tree fruit projects, it suggests the importance of relatively small amounts of cash income for rural households.

Gender differences in the division of labor related to tree fruit production, the control of tree fruit income, and access to productive resources are likely to play out in the impact of the projects. Producer groups appear to be an effective

means of reaching women and poorer tree fruit farmers.

### **Role of the Projects**

Both projects facilitate activities to promote upgrading of tree fruits, primarily product, process, and inter-chain upgrading. The aim is to improve the capacity of smallholders to respond to changing market demand and increase rural incomes. The baseline research identified specific forms of upgrading in the tree fruit value chain and polled the views of producers and other actors in the value chain on the incentives and disincentives to upgrade. All the sub-projects in the study promote the formation of producer groups as part of their strategy to link smallholders to input, service, and product markets. At the time of the qualitative research, producers groups had been formed, but most of them (except the avocado groups) were still at an early stage in their actual activities.

### **Baseline Research Conclusions and Implications for Round Two**

Smallholders are part of the tree fruit value chain, but they occupy a low position within that chain. They are numerous and active producers, but their productivity is low and they sell much of their produce under unfavorable conditions. Income from tree fruits plays an important role as a source of household income, especially for the poorer farmers, but income from tree fruit and total household income are both very low in most cases.

To varying degrees, the five interventions included in the baseline study succeeded in reaching low-income farmers. This means that there is potential for direct impact by raising rural household incomes through the projects.

Building stronger horizontal linkages by grouping producers and achieving economies of scale is an important part

of this potential because it helps poor farmers link to export markets – something they have very little opportunity to do by other means. The projects have been instrumental in organizing and strengthening tree fruit producer groups.

Vertical links to higher-value markets provide critical incentives for tree fruit producers to upgrade. So far, only one of the interventions studied – the EAGA avocado intervention – has begun to realize this potential by forging a direct link from farmers to the European market. This linkage has involved the provision of embedded spraying services by the exporter and negotiated MOUs between producer groups and the exporter. The process has required considerable “hand holding” by Kenya BDS and other support from USAID to help prepare smallholders to meet EUREPGAP standards.

Brokers remain alive and well in all three fruit value chains and continue to be important marketing channels for many farmers.

It is too soon to tell whether the project activities will result in “sustainable solutions” to the recurrent needs of tree fruit producers. This includes both embedded and stand-alone solutions/services that provide inputs, TA, or market access. In some cases changes might take place due to direct provision by the projects but it remains to be seen if embedded service arrangements, the commercialization of nursery and extension services, or the “network broker” concept of EAGA and Kenya BDS will last once the project activities end.

While scrupulous efforts were made to select control group samples for the baseline survey that were comparable to the participant samples, at the time of the survey the participants as a group were significantly better-off and more productive than the controls. When

each group is resurveyed two years hence, care will need to be taken in analyzing the results to ensure that differences in household wealth and other mediating variables are taken into account in determining the impact of the programs.

In the second round it will be crucial to review and document the interventions carefully. The activities are very different and the scopes of their activities and the approaches they take are likely to evolve over time. Finally, it will be im-

portant to analyze the commercialization issue, including a careful look at the specific services/solutions promoted during the course of the projects.

## I. INTRODUCTION

This report presents the findings from a baseline study of the impact of two projects to develop tree fruit value chains in Kenya. The study featured a survey of 1,947 smallholder farmers who grow avocado, mangos, or passion fruit in three provinces of Kenya – Central, Eastern, and Rift Valley. The sample included farmers who are participating in the Kenya Business Development Services project (implemented by the Emerging Markets Group, formerly known as Deloitte, Touche, Tohmatsu) and Fintrac's Horticulture Development Centre project, as well as a control group of non-participants. The survey was complemented by qualitative research involving in-depth interviews and focus group discussions with over 60 individuals involved in the tree fruit value chain, including farmers, farmer producer group leaders, input suppliers, extension workers, brokers, exporters, and Kenya BDS and Fintrac HDC project directors and staff.

This baseline study will be followed up in two years with a second survey of the same respondents as well as further qualitative research. The major findings on the impact of the two projects will emerge after this second stage of research. In the meantime, the present report will describe smallholder tree fruit cultivation in Kenya, note some of the characteristics of participants in this activity, and provide some preliminary indications of what impacts the projects may be having.

### A. MAIN FEATURES OF THE PROGRAM ENVIRONMENT

#### 1. DEVELOPMENT IN KENYA<sup>3</sup>

Kenya achieved independence from Great Britain in 1963 following a nationalist struggle. Significant economic growth was achieved through the 1970s, but growth slowed in the 1980s and per capita income declined in the 1990s under the dictatorial rule of Daniel Arap Moi. Hopes of national revival were raised by the free election of 2002, which brought to power a government headed by Mwai Kibaki. Yet the economic growth rate remained low and per capita income in 2003 was still below the 1990 level. Predicted economic growth rates have recently been revised upward to 3.3 percent in 2005 and four percent in 2006, based on accelerated disbursement of donor funds, strong performance by cash crops and tourism, and rising garment exports to the U.S. under AGOA. These rates reflect improvement on past performance but remain far from the six percent annual growth that the World Bank believes to be achievable if planned reforms are implemented in full.

Slow economic growth has combined with HIV/AIDS to cause poverty to rise and health conditions to worsen. The poverty headcount increased from 49 percent of the population in 1990 to more than 56 percent in 2003. Life expectancy fell from 57 years in 1986 to 45 years in 2004 while the infant mortality rate rose from 63 per live births in 1990 to 78 in 2002. The estimated

HIV/AIDS prevalence rate is currently 6.7 percent.

High fertility and rapidly increasing population have compounded Kenya's economic problem. The population grew from 9.4 million at the time of independence to 31.9 million in 2003, averaging more than three percent per annum. However, the total fertility rate has now declined to 3.3 births per woman and the population growth rate in 2004 was only 1.1 percent.

Kenya has many natural advantages as well as the largest and most diversified economy in the East Africa. According to USAID/Kenya, the country's perennial failure to achieve sustained economic growth is attributable to several factors:

- Governance issues: lack of democracy; over-concentration of power in the executive branch with inadequate checks and balances
- Corruption that pervades public administration
- Inconsistency in policies, laws, and regulations that adds significantly to costs of doing business and discourages investment
- Low productivity
- Rapid population growth
- HIV/AIDS
- Low levels of investment
- Inefficient and dilapidated infrastructure
- Vulnerability to drought
- Threats to Kenya's extraordinary environment<sup>4</sup>

The government that came to power in 2002 pledged to accelerate economic growth and reduce poverty. To this end, it formulated a poverty reduction strategy, known as the Economic Recovery

<sup>3</sup> References for this section include the *CIA World Factbook*, the Economist Intelligence Unit, USAID, and the World Bank.

<sup>4</sup> USAID/Kenya. 2000. *Integrated Strategic Plan 2001-2005*, pp. ii-v.



Strategy for Wealth and Employment Creation, and committed itself to shift public expenditure towards programs that benefit the poor, notably a free primary education program. Subsequently, however, political in-fighting over constitutional reform and other issues, together with signs of reluctance to tackle high-level graft, have raised doubts about the government's ability to reform and shake off the bad habits of the past. Kenya is heavily dependent on donor funding, which was withheld during the 1990s and is currently threatened once more by the governance issue.

Poverty and inequality remain severe, largely because most Kenyans are still low-productivity farmers. Agriculture absorbs 75 percent of the labor force but produces less than 20 percent of GDP. Farms are small on average. Most farmers are heavily dependent on rainfall and plant an average of 1.8 hectares in the rainy season.<sup>5</sup> Just over one-half of farmers have a deed to their land, while another one-third own the land but have no formal title. Many farms lack good access to markets. Close to one-half are located within five kilometers of a paved road. The average farm household has 6.8 members and is headed by a 53-year old. Male household heads (86 percent of the total) average six years of schooling, woman household heads four years.

<sup>5</sup> Data cited in this paragraph derive from the Rural Household Survey carried out by Egerton College, Tegemeo Institute, and Michigan State University in 2000, as reported in Nicholas Minot and Margaret Ngigi, "Are Horticultural Exports a Replicable Success Story? Evidence from Kenya and Cote d'Ivoire." Paper presented at the InWEnt, IFPRI, NEPAD, CTA conference, "Successes in African Agriculture, Pretoria, December 1-3, 2003.

## 2. USAID KENYA'S STRATEGIC OBJECTIVES

Based on U.S. foreign policy interests and Kenya's development constraints, USAID/Kenya identified four strategic objectives and one special objective for its programming in 2001-2005:

- **Strategic Objective 6:** Sustainable reforms and accountable governance strengthened to improve the balance of power among the institutions of governance
- **Strategic Objective 7:** Increased rural household incomes
- **Strategic Objective 3:** Reduce fertility and the risk of HIV/AIDS transmission through sustainable, integrated family planning and health services
- **Strategic Objective 5:** Improved natural resource management in targeted biodiverse areas by and for stakeholders
- **Special Objective 4:** Critical needs met for Kenyans affected by the bombing of the Nairobi Embassy in 1998 and capacity built to address future disasters

The activities covered in this report fall under SO 7. The Mission justifies this strategic objective as follows:

Since 80 percent of the Kenyan population lives in rural areas, and 75 percent are somehow involved in agriculture, Kenya's economy is therefore heavily dependent on its agricultural productivity. Over the past decade, however, agricultural productivity has declined and poverty has increased.

Over the same period, drought has plagued Kenya on an increasingly frequent basis, affecting 'traditionally' drought-prone areas, as well as many other agro-ecological zones (AEZs) of the country. While poverty is found in both urban and rural areas, 75 percent of the poor are in rural areas.

USAID/Kenya will, therefore, focus on increasing the incomes of rural households in selected high and medium potential and arid and semi-arid lands, most of which already rely on a combination of on- and off-farm activities...

Increasing rural household incomes is essential to achieving a prosperous and democratic Kenya. To sustain and improve public services and build democratic institutions, Kenyans must have higher incomes. A population with higher incomes is a population with higher expectations for its future and the future of its children. When people are able to pay for health and education services, these services can be sustained and improved. Likewise, economic growth will create financial stability and allow Kenyans to take a more constructive interest in the political environment that affects their economic well-being. (USAID/Kenya 2000, pp. 65, 83)

Kenyan agriculture is primarily organized in smallholdings and is almost exclusively rain-fed. According to the Mission's analysis, factors contributing to low and falling agricultural productivity include HIV/AIDS, a confused policy environment, the survival of marketing boards for a few key commodities (coffee, tea, and pyrethrum), poor access to credit and extension services, and weak smallholder organizations. (USAID/Kenya 2000, pp. 68-75)

The results framework adopted by USAID/Kenya for SO 7 includes four high-level intermediate results (IRs). IR 7.1 calls for increased productivity in three targeted agricultural sub-sectors: dairy; horticulture; and maize. IR 7.2 aims to increase the volume and value of traded agricultural commodities, especially dairy and horticultural products. IR 7.3 seeks increased access to busi-

ness support services (credit and savings; appropriate technology; skills, and business training) for micro and small enterprises. IR7.4 targets increased effectiveness of smallholder organizations in providing business services to members and representing their business interests. Below these four IRs, 15 sub-IRs are specified.

As discussed in the following section, tree fruit cultivation and other forms of horticulture are important activities for Kenyan smallholders. Raising productivity in these activities and the revenue earned from them should therefore contribute significantly to the increases in average rural household income that are sought by the GOK and USAID/Kenya.

Curiously, given the emphasis on raising average rural household incomes, little information seems to be available on the actual levels of these incomes. Tegemeo Institute, on behalf of USAID/Kenya, does track annual movements using a proxy method that it developed in partnership with Michigan State University.<sup>6</sup>

### 3. BACKGROUND OF THE HORTICULTURE SECTOR

Kenya's tropical and temperate climate zones favor cultivation of a wide range of horticultural crops. In the coastal lowlands, farmers grow mangos, citrus fruits, cashews, bananas, hot peppers, brinjals, and melons. In the middle altitudes, crops include bananas, mango, avocado, pineapple, grapes, passion fruit, pawpaw, citrus, flowers, onions, garlic, tomatoes, kale, cucumbers, pepper, okra, and French beans. At high altitudes, avocado, pears, apples, plums,

carrots, cabbages, peas, potatoes, and flowers are grown. Factors that favor horticulture production in Kenya include a climate that allows for year-round cultivation, fertile soils, and a competitive labor force with good education and technical background.

According to the 2000 Rural Household Survey carried out by Egerton College, Tegemeo Institute, and Michigan State University, almost all farmers in Kenya (98 percent) grew some fruits and vegetables and 35 percent of fruit and vegetable production was sold in the market. Overall, fruits and vegetables contributed 18 percent of average household income. Over 90 percent of households across income groups grow fruits and vegetables, although richer households market a larger share of their output and account for a large proportion of total sales. According to a study by the Institute of Development Studies at the University of Sussex, households involved in the production or processing of exported horticultural crops earned higher incomes than households that are not, other things being equal. This suggests that enabling more households to participate in the sector could reduce poverty substantially in both rural and urban areas (McCulloch and Ota).

While horticulture products have long been grown for home consumption, production for sale in domestic and export markets began in the early 20<sup>th</sup> century and has recently become one of the few success stories in an otherwise lackluster economy (Minot and Ngigi 2003, pp. 3-8). Domestic sales through traditional retail and public wholesale outlets, by far, dominate the market. While there are two large supermarket chains, they comprised less than five percent of domestic market horticulture sales in 2003. Much of what is sold in these supermarkets is procured directly from preferred growers – mostly commercial farmers and a small number of organized smallholders (Tschirley et al 2004).

Only two percent of farmers currently produce for export markets. The Horticulture Crops Development Authority (HCDA) estimates that 40 percent of exported fruit is produced by smallholders (cited by Minot and Ngigi 2003, pp. 10-11), with the remaining 60 percent produced by commercial farms.

#### Horticulture Exports from Kenya

Over the past two decades, export horticulture in Kenya has grown in importance, almost tripling in value between 1996 and 2001 (Table 1). Horticulture (comprising fresh fruits and vegetables and cut flowers) has become the nation's third most important foreign exchange earner after tourism and tea.

Kenyan horticulture products are exported primarily to Europe and the Middle East<sup>7</sup> where they compete with producers from EU countries as well as from other African, Middle Eastern, and Southern European countries. Consignments of fresh cut flowers, fruits, and vegetables are air freighted daily to various destinations from Kenya's two international airports. Some bulky produce is shipped from the port of Mombassa. The European Union is the principal importer of Kenya's fresh produce. The bulk of flower exports go to the Netherlands for sale by auction. By 1999, Kenya had become the leading supplier of flowers to the EU, followed by Israel, Costa Rica, Colombia, the USA, Ecuador, and Zimbabwe. Britain, France, the Netherlands, and Germany are the major importers of vegetables. Kenya has been described as one of the worlds' most successful exporters of fresh vegetables to EU countries; in 2002 it ranked second among non-members in the value of fresh vegeta-

<sup>6</sup> See David Tschirley and Mary Mathenge. 2003. "Developing Income Proxy Models for Use by the USAID Mission in Kenya: A Technical Report." Tegemeo Working Paper No. 7.

<sup>7</sup> Regional exports, especially to neighboring Tanzania and Uganda, are minimal. Overall, Kenya is a net importer of horticulture from these countries (Tschirley, et al 2004).

**Table 1: Value of Horticulture Exports (in millions of Kenya Shillings)**

Year	Fruits	Vegetables	Cut Flowers	Total Horticulture
1996	770	2,577	4,366	7,713
1997	805	3,116	4,888	8,809
1998	820	4,025	1,856	9,728
1999	1,256	5,713	7,235	14,204
2000	1,098	5,293	7,166	13,557
2001	1,560	8,035	10,627	20,221

Source: Cited in Dolan and Sullivan

bles (Jaffee 2003).<sup>8</sup> Beans and peas are the main vegetables supplied to Europe. The leading destinations for fresh fruit exports (mango, avocado, and passion fruit) are France, Dubai, the Netherlands, and the UK. Overall, nearly 90 percent of Kenyan horticultural exports go to Europe. The Middle East is a significant market for mangoes. Fruit exports grew rapidly from 1996 to 2001 but remained much smaller in value than either cut flowers or vegetables. The official figures are shown in Table 1.

The demand for horticulture products in the European markets is increasingly concentrated on fresh produce distribution channels in supermarkets. Another important factor influencing demand is increasing importance among consumers of food safety and the environmental and social dimension of the food supply chain. As a result, the regulatory environment is becoming more stringent, raising the bar for new entrants and posing new challenges for existing suppliers (Jaffee 2003).

Export marketing systems for horticulture differ by crop. While cut flowers are sent for auction in the Netherlands, vegetables and fruit are sold on export

contracts that specify quantities and prices. British supermarkets took an increasing role in the vegetable trade during the 1990s as a way of ensuring the quantities, safety, and qualities that they wanted. This shifted the trade from Kenyan wholesale markets, where Asian traders are active, to contracts with large exporters that obtain their produce primarily from their own farms and large contract farms. The move hurt small out-growers. Pre-packs for the supermarkets and Asian vegetables became increasingly important products during the 1990s.

Some 10-15 major exporting companies dominate the sector. These companies are very well organized, often with an integrated system of production/processing/transport/marketing. There is also a quite well developed small/medium size exporter sector who are well organized on production/transporting level, but less on processing and marketing due to their size of operation. There is a third level of exporters who still perform more or less in an ad hoc manner, and rely on the prevalent market situation and brokers for their existence. However, the latter group has almost disappeared from the flower export sector in the last five years, and will, most probably, decline also in the vegetable sector in the next five years due to the effects of the Code of Practice to be implemented. However, brokers make out an essential part of the fruit export sector and will continue to be important if Kenya is going to remain a fruit exporting

country in the future. (FKAB Feldt Consulting 2001, p. 8)

According to a sector study contracted by USAID/Nairobi (FKAB Feldt Consulting 2001), Kenya has several competitive advantages in export horticulture:

- A strong and well organized private sector
- A variety of suitable climates for different species
- A rather good main road infrastructure and good local supplies of inputs and implements
- Access to good air cargo handling facilities and airport services with adequate cargo space to major destinations
- Rather simple export documentation procedures
- Incentives for exporters (VAT reimbursement and duty-free imports of most inputs and implements)

Horticulture production for export has potential to benefit poor people in several ways: by increasing employment in production, transport, input supply, processing, sorting; by increasing jobs for unskilled workers, especially women; by increasing employment on large farms and plantations; and by building new knowledge and technology that is valuable in producing and marketing other high value products.

### Constraints to Horticulture Exports

**Demand Side Constraints:** According to Minot and Ngigi (2003, pp.9-10), the transformation of food retailing and

<sup>8</sup> The \$6 billion annual fresh *vegetable* market in the EU was supplied largely by EU producers. Among the \$950,000 million of vegetables imported from non-EU members, Kenyan exports account for \$100 million (Jaffee 2003). Similar data to show the position of Kenyan fresh *fruits* was not found.



changes in the structure of consumer demand in Europe are serious challenges for Kenya and other horticultural exporters:

- *The rise of supermarkets:* The share of fresh fruits and vegetables sold by supermarkets in the UK rose from 33 percent in 1989 to 70 percent by 1997. Increasingly, supermarket chains bypass wholesalers and buy directly from exporters in Kenya and other countries. To protect their reputations, the chains impose new restrictions and even organize production in developing countries.
- *Increasing concern over food safety:* The demand for horticulture products in the European markets is shifting with consumers increasingly aware of the health consequences of pesticide residues and placing more importance on food safety and the environmental and social dimension of the food supply chain. In response, the Fresh Produce Exporters Association of Kenya (FPEAK)<sup>9</sup> adopted a Code of Practice for growers in 1999. The Code includes a 14-step documentation procedure for ensuring the traceability of produce handled by the exporter. "This is an important step in establishing a common set of standards regarding safe handling of fresh fruits and vegetables and disseminating the information. However, some aspects of the Code imply significant costs and there are currently no enforcement mechanisms." (Minot and Ngigi 2003, p.10) More recently, EUREPGAP has significantly raised

the standard that Kenyan produce must meet to enter the European market, as well as the cost of compliance.

- *Competition from other suppliers:* Kenyan horticulture enjoys duty-free access to European markets. If and when this preference is terminated, Kenya will face increased competition from countries such as Egypt, South Africa, Chile, Brazil, and Thailand. Even without such a change, horticultural markets are highly competitive and subject to rapid shifts in export competitiveness. Kenya lost the European market for fresh pineapple to Cote d'Ivoire in the 1980s, was squeezed out of avocado exports to Europe by higher quality products from Israel and South Africa, and also lost the market for several temperate vegetables. It responded by finding new markets and expanding exports of French beans, Asian vegetables, and cut flowers. Export competitiveness evolves continuously in response to changes in markets, technology, and competitors (*Ibid*).

**Supply side constraints:** Enhancing the capacity of the Kenyan horticulture industry to respond to changes in market demand is critical to remain competitive in export markets. Small farmers need to become more competitive, not only today but also tomorrow. Projects such as those reviewed here need not only to create competitive advantage but also to sustain it. At present, however, challenging constraints exist on the supply side. Among the most critical are shortages of the seedling varieties needed for participation in exports and the lack (on the part of smallholders) of the knowledge, skills, and finance needed to grow fruit in ways that will safeguard quality and protect them from disease. The same study identified several important constraints and areas requiring improvement:

- A shortage of irrigation water in many areas
- A general shortage of skilled labor and qualified management staff
- High air freight rates and a need for more cargo capacity to London, Paris, and Frankfurt
- Inadequate communications, power supply, and rural feeder roads. Failure to exempt contract farmers and out-growers from VAT (because their products are exported through a third party)

The industry has perceived threats to its prosperity from both the Kenyan government and the EU. Recently there was a general fear that the government might raise taxes and fees that impact exporters. There was also a move to increase government control of horticulture by broadening the role of the Horticulture Crops Development Authority<sup>10</sup> – from being a facilitator to a more active role in buying and selling commodities like a marketing board -- but this seems to have been withdrawn following the change in government. (Minot and Ngugi, 2003, p. 5)

### **Constraints to Smallholder Participation in Horticulture Export Markets**

Despite the potential of horticulture sales to increase household incomes and reduce poverty, a large majority of Kenya's smallholder horticulture producers remain outside the more lucrative export and supermarket segments (Tshirley et al 2004; Muendo, Tschirley, and Weber 2004). Moreover, recent data suggest a downward trend in the share of smallholder production in these markets. Smallholders' share in export horticulture has fallen from 75 percent in the early 1990s to perhaps 45 percent today, indicating a "clear decline and rough challenges ahead" (Muendo, Tschirley, and Weber). Because exports

<sup>9</sup> FPEAK is an organization that represents than 140 members who are active exporters and other interest groups. Besides formulating and implementing a Code of Practice to ensure quality produce grown and shipped in an ecology- and worker-friendly environment, FPEAK maintains a database of local products and suppliers and provides market leads and contacts to members. Its secretariat is assisted by USAID.

<sup>10</sup> The HCDA was formed in 1967 and carries out a variety of promotional activities.



have soared, this does not necessarily imply an absolute decline in the quantities that smallholders supply to the export market, but it does suggest limitations on new opportunities.

In the context of this dualistic market, smallholders participate primarily in traditional markets, which at present are not competitive even on a regional basis. There are relatively few regional exports, largely because of high transportation costs. Kenya is in fact a net importer of horticultural products from Uganda and Tanzania. While Kenyan exports have been competitive in international markets, the stringent quality standards that are being introduced in EU and other export markets are likely to further raise the bar for small scale producers – thus further limiting their participation in these markets. As stated in an article from *The Financial Times*:

In the wake of mad cow disease and other scares, European authorities demand ever tighter food quality controls. A bewildering array of these already apply. There are more than a dozen quality standards across the EU, usually set up and monitored by the trade...For poor countries like Kenya, the question is whether the regulations, or non-tariff barriers, are becoming incompatible with the vision of development that sees small-scale crop production of export crops as central to poverty reduction. (Wallis)

As the *Financial Times* article suggests, large producers and exporters find it easier and cheaper to comply with such regulations than do small and medium firms because large firms can spread the cost of compliance, which is substantial, over a larger volume of sales.

## B. PROGRAM DESCRIPTIONS

The two projects covered by this assessment are designed to promote growth in Kenya's tree fruit agriculture and encourage smallholder participation in the tree fruit value chain. USAID/Kenya funds both in support of their strategic objective to increase rural household incomes in Kenya (SO 7).

The overall goals of the Kenya BDS and Fintrac HDC projects are to:

- Increase small farmer and household incomes
- Promote growth in final sales in selected commodities
- Increase outreach and sustainability of solutions/services offered by multiple providers to large number of micro-enterprise clients
- Foster a better-skilled and more competitive MSE sector

The projects seek to:

- Raise **productivity** through market intervention by promoting the production of higher grade, better quality fruit by facilitating access to improved stock and seedlings, productive inputs, training, extension and information services
- Increase **market outlets** in selected areas by facilitating direct links between smallholder producers and lead firms involved in fruit export and processing and promoting the formation of producer groups
- Facilitate **inter-firm cooperation** and organization within the overall value chain, between producers, input suppliers, producers and buyers, by organizing and building the capacity of tree fruit producer groups, linking smallholder MSEs to lead firms that provide embedded services, and facilitating other business arrangements and relationships
- Promote the development of sustainable **business solutions/services** for rural MSEs

The Kenya BDS project focuses on vertical linkages, especially the link connecting farmers to lead firms. It is essentially a business model, which emphasizes improved market access and incentives for smallholders and enhancement of their capacity to respond to price incentives through embedded services provided by lead firms and input stockists. The Fintrac project includes a technical component (improved planting stock and cultivation methods) and tries to improve the international enabling environment through its work with European retailers to shape their standards so that Kenyan farmers can meet them and by helping producers meet the retailer's rising quality standards.

## 1. KENYA BDS PROGRESS TO DATE

Kenya BDS, a five-year project that started in 2002, was intended to work in three sub-sectors; tree fruit was the first sub-sector selected.<sup>11</sup> During its first two years, the project issued tenders and awarded contracts to eight private sector and NGO partners active in the production and marketing of tree fruit. The contracts were designed to facilitate the development of sustainable business solutions that provide material inputs (agro-chemicals and seed varieties), appropriate technology to upgrade products and production processes, business and skills training, and extension and information services. Several contracts promote market linkages between smallholder producers and lead firm exporters through supply contracts and lead firm provision of embedded services, and encourage inter firm cooperation through organization of producer groups and provision of embedded ser-

<sup>11</sup> The second sub-sector chosen was Lake Victoria Fish; the third sub-sector has not yet been identified but is likely to be a non-agricultural activity.

vices. Embedded services are products/services/solutions that are provided on a non-fee basis by one firm to another as part of their commercial transactions. Examples include: 1) buyers/exporters who offer pre-financing, technical advice, or inputs to their producers in order to ensure a quality product that meets market standards; 2) input suppliers who provide training/technical advice to MSEs in the use of the product they sell in order to ensure correct/successful usage of the product.

The box below shows the range of activities undertaken under the Kenya BDS tree fruit contracts. Annex A details activities by fruit, partner, and location.

Kenya BDS initiated on-the-ground project activities in 2003, almost a year before the first round of data collection for this impact study. Over the course of that year, project staff observed a number of changes in the tree fruit value chain as a result of project activities.

In order to capture the full impact of the project, it is important to document these activities and the observed changes.

#### Avocado

Kenya BDS in 2003 negotiated a memorandum of understanding with East Africa Growers Association (EAGA), a large horticulture export firm in Kenya, to link with avocado producer groups in two locations in Central Province. In the first year, Kenya BDS mobilized 803 avocado farmers who organized producer groups and, with the help of a facilitator hired by Kenya BDS, negotiated a contract with EAGA to supply avocados that meet agreed upon standards. EAGA provides embedded spraying services, grades the fruit, and transports it to their warehouses. Group members have been trained in the application of manure and fertilizers, pruning and orchard hygiene to upgrade the quality of their fruits. Near the end of the first year, Kenya BDS mobilized an additional 283 avocado farmers in 10 groups in several new locations. These pro-

ducer groups are working with another lead firm, Kenya Horticultural Exporters (KHE). Farmers began basic pruning, and spraying and had plans to negotiate contractual arrangements with KHE. Kenya BDS also has plans to work with another exporter, Indu Farm (EPZ) Limited in the next quarter.

At the survey site in Kandara, EAGA activities with avocado groups during the year prior to the baseline survey included the following:

- EAGA, with Kenya BDS support, initiated the organization of avocado producer groups (the farmers were not previously organized).
- Contracts were drawn up between the producer groups and EAGA. The producer groups agreed to sell exclusively to EAGA, to upgrade their avocado production, and to follow a good agricultural practices protocol.
- EAGA purchased avocados at a negotiated price, provided spraying and grading services for a fee deducted at the time of sale, transported fruit to their warehouse in Nairobi, and paid farmers through their group accounts. According to farmers, spraying was not done on time during the first year, which reduced the yield of high-grade fruit.
- Kenya BDS encouraged the revival of a processing factory that will buy lower grade fruit to process avocado oil and promoted a linkage between EAGA and this factory. If this plant becomes operational, EAGA plans to buy all grades of fruit from producers and drop off lower grade fruit at this processing factory on their way to Nairobi.

During this time, project staff observed the following changes:

Avocado brokers have been less active in the area since the contractual agreement was initiated. EAGA met with the brokers (who they buy from) and asked them not to buy from group members

**Figure 1: Activities under BDS Tree Fruit Project**

<i>Input supply</i>	→	Facilitate the provision of inputs, Establish nurseries, Establish a credit facility link between agrochemical distributors and stockists, and Develop a monitoring system to inform manufacturers and stockists on consumer trends.
<i>Extension and training</i>	→	Improve commercial extension services, Create farmer-led extension teams, Launch information campaigns, Train agrochemical stockists in advisory services and business management, and Raise farmer awareness on safe use of chemicals.
<i>Market access</i>	→	Facilitate market linkages, Improve market information through SMS technology and trading floors, Establish collection sites, Facilitate improved transportation, and Facilitate brokerage workshops.
<i>Inter firm cooperation</i>	→	Form and build capacity of producer groups.

in this area. At least one other exporter has entered the area to compete with EAGA to buy upgraded fruit. Production and sale of avocados was very low prior to the EAGA initiative. Since then, avocado sales volumes have increased dramatically and the prices received by producers have also increased. Kenya BDS staff cite this as a critical impact to capture, since avocado income was almost nil at the beginning of the project.

Kenya BDS handholding activities have promoted information flows, built trust, and forged linkages between the exporter (EAGA) and producer group members, between training and extension workers and producer group members, and among producers themselves.

### **Mango**

Kenya BDS is working with four partners to develop the mango value chain.

1. SITE is a local NGO supported by Kenya BDS. As of December 2004, when the quantitative survey was conducted, SITE was working with groups of farmers in eight mango production clusters in four districts of Central and Eastern province. Its work with farmers focused on building linkages with reliable markets and increasing the accessibility of business services to increase the quality and productivity of mango orchards. At this time, 2,461 farmers growing Apple, Ngowe, Tommy, Kent, and Van Dyke mango varieties had been mobilized through 83 producer groups. During the first phase of the project, SITE hired five private service providers to offer extension services and strengthen the farmer groups. They organized training for farmers in mango as a farming business and helped link the groups to input suppliers and microfinance service providers. While SITE was able to get four exporters to establish direct

linkages with farmers, only 17 percent of the mango farmers in the groups benefited. Nevertheless, through these contracts, which often benefit only large farmers, small farmers were able to participate. Exporters made payments through the farmer groups' bank accounts, which provide a more secure means of payment for the farmers. Kenya BDS reports indicate that prices improved from Ksh 3-6 per mango to Ksh 7-12.

2. Kenya BDS staff observed that creating longstanding win-win market relationships between mango farmers and lead firm buyers and exporters is challenging. It requires time and considerable 'handholding' to build trust, change attitudes, and instill work ethics. In late 2004, Kenya BDS awarded a second phase of support to SITE, focused on strengthening producer groups to operate as units in dealing with buyers; coordinating farmer access to material inputs; and actually establishing longstanding market linkages.
3. KADI and the Catholic Dioceses of Embu have contracted with Kenya BDS to promote extension services for mango farmers in Eastern province. These efforts include an information campaign to raise awareness of farmers on nursery development and the benefits of nursery seedlings; training of nursery operators in mango husbandry and business management; and training of extension service providers on grafting, budding, and top work.
4. Coastal Development Authority provides on-farm training of trainers for unemployed extension officers. They also are creating Farmer Led Extension Teams (made up of lead farmers and extension agents) to provide commercially viable ex-

tension services; launching an information campaign to increase awareness of value of extension services; and establishing a revolving fund to finance adoption of good agricultural practices

5. KWETU, KARI, and Kenya Gatsby Trust are working with mango farmers in the Watumu/Msabaha and Malindi areas of Coast province. Through a contract with Kenya BDS, they are forming producer groups and facilitating market linkages to buyers through the development of a market information data base and brokerage workshops. They also are training private extension workers in mango husbandry and business management and launching a campaign to sensitize producer groups to the value of extension services.

### **Passion fruit**

Kenya BDS is working with Fineline Systems and Management Limited, who are now coordinating the whole program among the farmers while EAGA is providing both the export and domestic market and embedded services in terms of input supplies and extension services. Just Juice is now left with the role of providing a demonstration plot and quality seedlings to help passion fruit growers in Meru and Embu districts. This work was just beginning to take off in October 2004 when the baseline research began. It took some time to get producer groups organized in this area. By December 2004, however, 744 farmers had been organized into 26 producer groups. Twenty-three percent of the farmers were women. Project activities include training group members in nursery establishment, land preparation and planting, orchard maintenance, and post harvest handling. They also focus on facilitating direct linkages with exporters through supply contracts; regular collections of fruit; and exporter-led technical advice and

spraying for pest and disease management. The aim has been to ensure regular payments, stable and guaranteed market prices, and prices that are higher than those paid by brokers. A central demonstration plot and nursery had been established with land donated from Just Juice, Ltd. and technical and material inputs provided by KARI -- representing a public/private partnership. The site provides extension services and quality seedlings. Growing out of this, as of December 2004, five group nurseries and 48 individual nurseries had been established and farmers had planted 96,000 passion fruit vines. The plan is to expand to 80 groups involving 2,400 farmers in 2005.

### **Kenya BDS's Facilitation Role**

The Kenya BDS project is designed to promote efficiencies and growth in tree fruit agriculture through the development of business services and other broad facilitation activities. While the approach has been to award contracts on the basis of competitive bids, for its work with avocado farmers in Kandara and passion fruit farmers in Meru and Embu (which started out as an agreement with Just Juice) Kenya BDS has taken a somewhat more active "hand holding" role in promoting upgrading and market linkages. For avocados, this had involved placing a full-time Kenya BDS staff person on the ground in the Kandara area. She has played a role in identifying producer group leaders, forming producer groups, setting up record-keeping systems, and negotiating contracts between the producer groups and EAGA. Her roles in linking producer groups to EAGA and building trust by keeping regular lines of communication open has been instrumental. This approach has led to significant progress during the first year in avocado upgrading and market linkages. A similar approach is underway in Meru/Embu with passion fruit growers.

Market principles underpin the Kenya BDS approach.<sup>12</sup> The project does not cover costs for spraying, other inputs, or extension services, or subsidize producers in other ways. Nor does it inform producers about the prices at which exporters sell. While some smallholder participants thought that Kenya BDS would be a more active advocate for them in getting better prices, project staff emphasized that this is the role of the market and that if they played this role, the information provided would distort the market. They feel that the litmus test should be whether the smallholders are better off than they were before, not the price they received in relation to world market prices. Kenya BDS wants to play a very businesslike role in the process. Their main aim is to diversify market outlets and promote competition. Kenya BDS staff members do not want to embed themselves in the supply chain.

Several lessons emerged during the first year of the Kenya BDS project. From the perspective of Kenya BDS leadership, the approach of contracting through open bids has worked well. The short-term nature of their contracts is a positive feature of the project in that it provides flexibility and responsiveness in their approach. In the case of KACE, for example, Kenya BDS had a one-year contract to promote market information on tree fruits through SMS technology. They discovered that KACE had a number of problems and a business model that they did not really agree with, and after a year they decided not to continue with this sub-project. Other USAID projects are typically longer (up to five years) and provide much less flexibility to cut losses.

Another lesson is the importance of Kenya BDS's "hand holding" role in building trust between producers and

the exporters. Kenya BDS staff have brokered the relationship and facilitated communication to help each party to understand the needs of the other. In the future, as part of its exit strategy, Kenya BDS wants to explore the potential for commercializing the role that its staff currently plays - referring to this role as a "network broker." Its follow-on Memorandum of Understanding with EAGA is addressing this issue. One question is the potential for EAGA or producers groups to absorb the costs of this function as an embedded service.

From the perspective of one lead exporter, forward planning is one of the biggest challenges in the horticulture export business. Exporters have forward contracts so they must plan ahead for the uplift of fruit and cannot operate *ad hoc*. A challenge in working with smallholders, from this exporter's perspective, is projecting a timeframe of production, sales, and returns. They need to establish ground rules and work together to develop a commercialization strategy from day one.

EAGA's experience in linking directly to avocado farmers has had a demonstration effect within the company. While the costs of interacting directly with groups and providing embedded services is more for EAGA than buying directly from middlemen, it is an approach that ensures good quality and good supply - something middlemen cannot always provide. Similar models can be used for snow peas, sugar snaps, and French beans.

## **2. FINTRAC HORTICULTURE DEVELOPMENT CENTRE (HDC) PROJECT PROGRESS TO DATE**

Fintrac's HDC project focuses on a wide range of horticulture products, one of which is passion fruit. This impact

<sup>12</sup> Based on interview with Muli Musinga, David Knopp, and Rose Warui.



**Figure 2: Activities under HDC Tree Fruit Project**

<i>Input supply</i>	→	Introducing new varieties of passion fruit Producing plant stock Establishing commercial nurseries
<i>Extension and training</i>	→	Establishing demonstration plots Providing extension services to farmers
<i>Market access</i>	→	Linking smallholder producers to domestic fresh fruit markets Linking smallholder producers to processors of juice concentrate for domestic and export markets Training in EUREGAP certification
<i>Inter firm cooperation</i>	→	Delivering services through farmer groups

study focuses only on their passion fruit work, which includes plans to:

- Develop Kenyan varieties of passion fruit for fresh export
- Improve agricultural practices of local producers
- Expand local processing capabilities for local market products
- Strengthen the farm-to-market value chain, inclusive of business services to small farmers

Unlike Kenya BDS, the HDC project does not operate through contracts and MOUs but carries out activities directly through project staff based in Nairobi and agronomists based in four field offices. It works with and through cooperating partners, including the Kenya Agricultural Research Institute (KARI), existing smallholder associations, and two small businesses producing plant stock. In the future, it intends to work through other input suppliers as well. This five-year project began in late 2003 and was in its first year of operation at the time of the baseline survey.

The project decided to focus on passion fruit because it is regarded as a relatively friendly crop for smallholders. Production carries low risk and the market potential is high. Initial project activities related to passion fruit focus primarily on product development by addressing

two key constraints to smallholder production: production technology and farmer knowledge. To this end, Fintrac HDC is cooperating with KARI on training and plant production, and with various small businesses in Eldoret, including input suppliers and nurseries. The HDC project hopes to establish 30-40 good demonstration plots and, through them, have a ripple effect on passion fruit production throughout Kenya. It is trying to develop and produce fruit varieties that will yield more juice, including the introduction of the jumbo variety from Uganda. It also hopes to find a good investor to build a processing plant that would require input of 50 to 100 tons per week.

Training in EUREPGAP certification also will be an important project activity. They will train producers and companies on requirements for export certification. The goal is certification in 2005. They will train three companies who in turn will train 600 producer groups (with 20 members each).

### **Progress to Date**

Fintrac's HDC activity with passion fruit growers in the Eldoret area prior to the baseline survey focused primarily on promoting input supply and extension activities. These included:

- Identifying farmer groups interested in planting grafted passion fruit, which has stronger root stock and more disease resistance
- Linking farmer groups with a nursery operator who produces grafted passion fruit plant stock
- Coordinating with HCDA and the MOA in linking farmer groups to public training and extension resources, some of it related to compliance with EUREPGAP standards

Activities within the project area were just getting underway when the baseline research began in October 2004. Fintrac HDC had identified producer groups and had linked these groups to a nursery operator supplying grafted seedlings. Producer groups began receiving grafted seedlings to plant in demonstration plots in October 2004.

## II. DESIGN OF THE IMPACT ASSESSMENT

The purpose of this study is to assess the impacts of the Kenya BDS and Fintrac HDC projects on:

1. The competitiveness of the mango, passion fruit, and avocado value chains;
2. The integration of micro and small enterprises (farmers and others) into these value chains in a way that they contribute to and benefit from the tree fruit industry's increased competitiveness;
3. The development of sustainable solutions to constraints facing businesses in the targeted industries; and
4. Rural household incomes.

The baseline study will be followed up in two years, with the major findings on the impact of the two projects emerging after this second stage of research.

### A. KEY QUESTIONS

The Kenya BDS and Fintrac HDC projects have taken on a twofold challenge: improving the competitiveness of Kenya tree fruit exports in global markets and increasing the participation of smallholders in the tree fruit value chain. In this context, key questions facing both projects is whether Kenya can stay competitive in global tree fruit markets and at the same time maintain a high level of smallholder participation in the value chain. A related question is the potential for smallholder involvement in the tree fruit value chain to contribute to poverty reduction by increasing smallholder enterprise profits and household incomes.

Accordingly, this impact assessment examines the impact of the project-facilitated interventions in improving

the competitiveness of Kenya's tree fruit agriculture, integrating smallholders -- including women smallholders and smallholder households headed by women -- into the value chain, and raising household incomes. A related question is whether project-facilitated interventions have led to the development of sustainable solutions to problems faced in tree fruit agribusiness, which are key for sustained impact.

Our research design attempts to address these questions by defining suitable impact variables and measures. These flow from the causal model described in the following section.

### B. THE CAUSAL MODEL

The study design is based on a causal model of impact that shows how project facilitation activities to promote sustainable solutions/services can address constraints to smallholder participation and competitiveness of the value chain. These activities, in turn, lead to sustained access to solutions, increased smallholder MSE profits from tree fruit activities, increased rural household incomes, and overall value chain growth. (Figure 1)

### C. HYPOTHESES

We use this causal model to test a number of hypotheses about the impact of donor interventions in opening up opportunities for smallholder MSEs in local, regional, and global markets and in improving the competitiveness of the overall value chain.

**General Hypothesis:** Project activities can be effective in the development and improvement of sustainable solutions in the areas of market access, extension

services, input supply, and inter-firm cooperation that result in increased vertical and horizontal integration of MSEs into value chains and greater competitiveness of those value chains.<sup>13</sup>

**Hypothesis 1:** Project activities to promote sustainable solutions in the tree fruit value chain contribute to greater integration of smallholder MSEs into the value chain through:

- Strengthened vertical linkages permitting increased market access for smallholder MSEs producers
- Improved/increased inter-firm cooperation/collaboration (horizontal linkages)
- Improved supporting markets
  - Increased use of appropriate inputs (agrochemicals, plant stock, and other supplies)
  - Use of higher quality inputs
- Improved/increased quality and quantity of extension, advisory, and information services provided by lead firms (embedded) and fee-based providers

**Hypothesis 2:** Greater integration of smallholder MSEs into the tree fruit value chain contributes to improved enterprise performance and household well-being through:

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<sup>13</sup> In general, program interventions can be characterized as potentially involving efforts to boost product demand, improve the business environment, strengthen vertical and horizontal linkages, and/or improve private sector supply response. The Kenya BDS and Fintrac projects emphasize linkages and supply response. Except for Fintrac interventions around EUREPGAP, they seem to do little to improve the business environment for tree fruits in Kenya (possibly because major constraints in this area were not identified).

- Increased production in participating enterprises
- Increased revenues in participating enterprises
- Increased employment and employee earnings in participating enterprises
- Increased income in participating smallholder MSE households
- Reduced vulnerability through diversification of income sources in participating smallholder MSE households

**Hypotheses 3** Greater integration of smallholder MSEs into productive value chains contributes to improved competitiveness and growth of the targeted value chains.

- Increased production by the value chain as a whole
- Increased average productivity
- Increased share of production marketed
- Increased share of production exported
- Improved inter firm cooperation (horizontal and vertical coordination and business arrangements)

## D. FRAMEWORK OF ANALYSIS

As indicated earlier, we will study impacts at four different levels: participating smallholder MSEs; their associated households; the tree fruit value chain; and the provision of sustainable business solutions. At each level of analysis, we have identified several domains of impact and indicators of change, as shown in Figure 2.

### 1. PARTICIPATING TREE FRUIT SMALLHOLDER MSEs

The study will focus on the main intended beneficiaries of the two projects in Eastern, Central, and Rift Provinces, namely smallholders who grow mangoes, avocados, or passion fruit for con-

sumption or sale<sup>14</sup>. The smallholder analysis will compare a sample of smallholders who participate in the Kenya BDS or HDC project with a sample of comparable smallholders who do not participate in either of these projects. It will study changes associated with participation in one of these projects in the following domains of impact.

### Smallholder MSE Integration into Productive Value Chains

This will involve assessing and comparing changes over time in smallholder MSE participation in the tree fruit value chain.

Integration into the tree fruit value chain will be measured by the volume and percentage of production that is marketed, the average price received for marketed output, and thus sales value. The study will focus on access to and use of market information and sales to different market outlets. Other issues related to smallholder integration into value chains will be explored through qualitative, in-depth interviews with smallholders, for example, whether and how participation in producer groups provides advantages to smallholders; the extent to which access to new market outlets changes smallholder relationships with brokers and the implications of this over time; the nature of smallholder relationships with lead firms or other buyers or suppliers providing embedded services.

Participation of lead firms, brokers, and other buyers in marketing smallholder production and their experience in providing embedded services also will be examined through qualitative interviews.

<sup>14</sup> Further details are given in the sample design section.

### Enterprise Production Processes and Performance

Changes in production processes will reflect changes in skills, knowledge, and practices related to tree fruit production and processing (plant husbandry, use of agrochemicals, etc.); use of market information; use of technologies; and capital investments (e.g., tools and equipment). Measures of enterprise performance will include production, productivity, employment, and technologies used. Production is the total amount of fruit produced in a season. Productivity will be measured by quantity produced per hectare or per tree (the more appropriate measure is to be determined) over a season. Employment will be measured by the reported person/days of hired labor used for tree fruit production, harvesting, processing or sale over a season. Technology use will be measured by the use of planting stock and inputs, and the watering system.

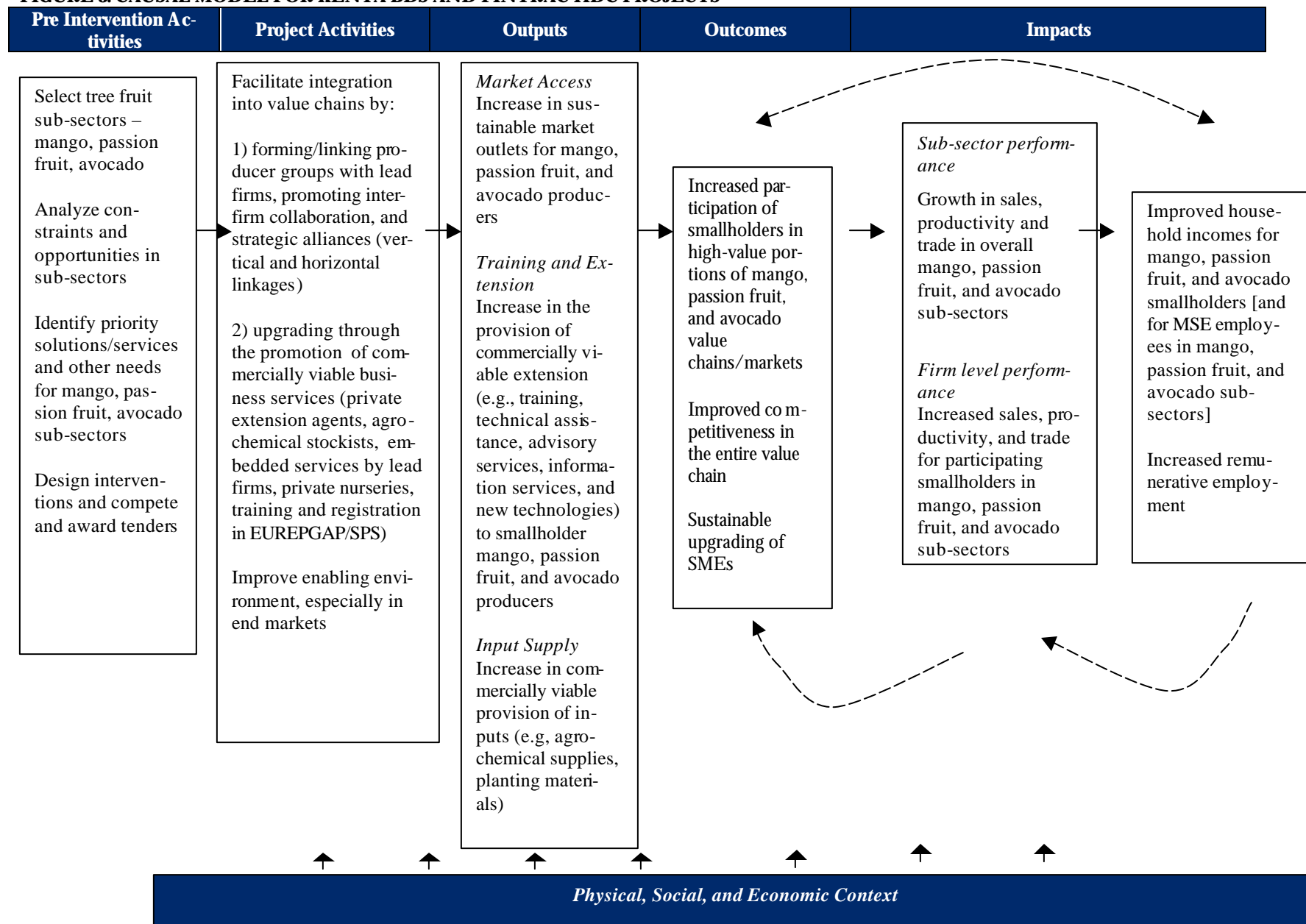
## 2. SMALLHOLDER MSE HOUSEHOLDS

This part of the impact assessment focuses on the households of smallholder MSEs participating in the projects and households of smallholder MSEs not participating in the projects.<sup>15</sup> It studies impacts on household well being using a combination of variables: changes in household consumption (as a proxy for income), changes in sources of household income ranked by importance (including tree fruit income) and changes in household assets. The use of several variables allows for triangulation in assessing changes in household well being.

Increased household incomes: The measurement of household income

<sup>15</sup> To the extent possible, we will also focus on smallholder MSE employees – depending on whether this emerges as a significant group among participating smallholder MSEs.

**FIGURE 3: CAUSAL MODEL FOR KENYA BDS AND FINTRAC HDC PROJECTS**





through the baseline survey is clearly important. After the follow-up survey round, we would like to be in a position to say whether the two projects helped to raise the household incomes of project participants. Measurement of household income in rural settings poses difficult challenges, however: the existence of multiple income sources; the importance of income in kind; irregularity in income flows; lack of record-keeping; and respondent misreporting due to recall error, misunderstanding, or mistrust.

Consumption is considered by many to be a more reliable measure of household economic status than income in contexts like rural Kenya. It is seen to be less subject to measurement error than income, and is a better proxy measure not only of current welfare but long-run wealth. The study uses the following consumption/expenditure measures of household income: consumption in the last seven days of items grown at home; expenditure on education in the last 12 months; and other expenditures over the last four weeks including, for example, vegetables, meat, packaged food, groceries, cooking fuel, transport, and communication.<sup>16</sup> These measures are then combined to create a proxy for household incomes.

### Reduced Vulnerability

An important dimension of poverty is vulnerability, which has been defined as the exposure to and the capacity to manage risk. Diversification of income sources is one way poor households manage risk by 'income smoothing,' or evening out seasonal fluctuations of income throughout the year. The survey includes a short set of questions about sources of household income and the relative importance of each source of income, including tree fruit income.

This allows us to assess diversification, income smoothing, and the role of tree fruit income in this process. Assets also help households to manage risk by providing a store of wealth to draw upon in times of need or opportunity. An increase in household assets can indicate reduced vulnerability. The survey also includes a set of questions related to ownership of selected assets relevant to rural Kenya that will be used to construct an asset score. This includes some assets that are likely to be responsive to short term changes in household income. We use the asset score for two purposes: (1) to assess the impact of project participation and increases in tree fruit income on household assets and (2) as a proxy to determine the relative wealth level of households in the sample.

To complement the survey data on households, the study also includes in-depth interviews with a small number of smallholders to explore the role of tree fruit income in households, and (at the end line) the implications of additional tree fruit income for household well-being. The in-depth interviews explore this source of additional income for income smoothing, control and use of tree fruit income within the household, labor allocation related to tree fruit production, and quality of employment issues for those involved in tree fruit production. The in-depth interviews also explore decision processes and incentives at the household level related to participation in the tree fruit value chain. How the broader portfolio of household economic activities affects decisions related to expanding tree fruit production, switching from another cash crop to fruit trees, or selling tree fruits to new market outlets will be explored. Differences by gender and socioeconomic status are considered throughout.

## 3. TREE FRUIT VALUE CHAINS

The next level of analysis to be addressed is the tree fruit value chain, comprising all producers of mangoes, avocados, and passion fruit in Kenya (or, alternatively, based on data availability, in the areas covered by the two projects).

Production processes in the tree fruit value chain will be gauged by total production of the three tree fruits, average productivity, employment, and the technologies used.

Integration of MSEs into the value chains will be measured through the value and volume of sales to export and domestic markets. Changing marketing channels for both exports and domestic sales will be examined. To determine what is going on in the marketing process, information will be collected not only from smallholders (to whom do they sell their products, at what price, etc.), but also those who buy from smallholders as well as from buyers and sellers at higher levels of the marketing chain including lead firms. The inquiry will investigate the nature and extent of embedded services as well as commodity transactions.

While analysis at the MSE and household levels will compare the results achieved by program participants with those achieved by a control group of non-participants, no valid control group can be constructed for the value chain as a whole. Although determining attribution will thus be difficult at this level, developing the entire value chain is an important objective of the two projects and thus cannot be ignored. Some of the growth in production, income, and other impact variables experienced by non-participants within the value chain will in fact be attributable to the projects through spillover effects, but this will be difficult to identify and measure.

<sup>16</sup> These indicators have been used in the Kenya Welfare Monitoring Survey (1999)

## 4. PROVISION OF SUSTAINABLE SOLUTIONS

The provision and use of sustainable solutions will be measured in a variety of ways. Improved **market access** will be measured based on increased/improved market linkages between smallholder/MSEs and their buyers. The study will assess the extent to which MSEs currently benefit from market linkages and to what extent those market linkages are increased or improved over the life of the projects.

Improved **provision and use of agricultural inputs** will be measured by total usage of agro-chemical inputs, improved planting stock, and other supplies. Information gathered from smallholders (about their input purchases) will be combined with information gathered from stockists and other sellers of inputs to smallholders. This will include study of the provision of embedded business services to smallholders by input suppliers.

Improved/expanded **training and extension, advisory, and information services** will be measured through analysis of the use of training, extension, advisory, and information services by smallholders, how much they pay for these services, and the types of agents who provide extension and training on either a freestanding or an embedded basis:

- Private extension officers (offering extension services related to plant husbandry, application of agrochemicals, organization of producer groups, and business management training)
- Farmer-led extensions teams
- Lead firms or suppliers providing embedded extension services
- Stockists and other input suppliers providing embedded extension/training services

- Agrochemical distributors supplying stockists
- Nursery operators/seedling suppliers
- Financial brokers or financial service providers
- Providers of market information
- Organizers of producer groups

The sustainability of services/solutions<sup>17</sup> will be determined by assessing whether or not commercial relationships are intact at round two. The study will also consider whether someone is providing a fee-based or embedded solution and whether someone is using it.

Figure 2, below, summarizes levels of analysis, domains of impact, indicators of change, and sources of information.

## E. DATA COLLECTION STRATEGY

The baseline study included: (1) a quantitative component involving survey of smallholders and review of secondary market information and (2) a qualitative component consisting of focus group discussions and in-depth interviews with actors in the tree fruit value chain.

### 1. SURVEY OF SMALLHOLDERS

The quantitative component of the study involves (1) a longitudinal survey of smallholder MSE tree fruit producers with plans to collect data in two rounds, two years apart and (2) a review of secondary market level information during this time period on the production and sale of mangos, passion fruit, and avocados.

The smallholder survey is quasi-experimental in design, with data collected at two points in time, two years apart, on a sample of participating and non-participating smallholders in tree fruit agriculture. This longitudinal quasi-experimental design allows for a comparison of changes over time in enterprise and household level variables between participating and non-participating smallholders. The difference between participants and non-participants at the end of the study will indicate the impact of the project on variables studied.

A study team, led by Research International Kenya, carried out the first round of data collection between November 2004 and January 2005.

### Questionnaire Design

The survey questionnaires asked about sources of market information, use of capital, labor and material inputs, participation in training, use of extension services, market linkages, productivity, employment and income. Household level questions focused on changes in household income, consumption expenditures, and assets. A similar set of questions and indicators was used across the three fruits and five sub-projects. Where necessary, some of the questions were slightly adapted to accommodate the specific fruit (for example, measures of productivity, descriptions of varieties, or sales outlets). They were translated from English into one local language – Kikuyu in Central province. In Eastern province and Rift Valley province, Kiswahili was used. The questionnaires took approximately 50 hours to administer.

<sup>17</sup> Sustainability of services/solutions is defined as the ability of the services/solutions to be kept going over time without donor subsidy.

**Figure 4: Framework for Studying Impacts**

Levels of analysis	Domains of impact	Indicators of change	Sources of information
Tree fruit Smallholder MSEs	Increased integration of smallholder MSEs into tree fruit value chain	Increased sales/market linkages Increased price received Increased marketing channels used Increased/improved use of agricultural inputs Increased/improved use of extension services	Survey Case studies
	Improved production processes	Skills, knowledge and practices Use of market information Use of technology Capital investment (tools and equipment)	Survey Case studies
	Improved smallholder MSE performance	Increased revenues Increased productivity Increased employment	Survey Case studies
Smallholder MSE House- holds	Increased incomes	Proxy measure of increased household income (consumption/expenditure) Higher ranking of tree fruit income as source of household income	Survey Case studies
	Reduced vulnerability	Diversification of household income sources Income smoothing Increased assets	Survey Case studies
Markets	Provision of sustainable solutions to recurrent constraints of MSEs in the value chain	Improved and sustainable market access Improved and sustainable input supply Improved and sustainable extension, advisory, and information services	Survey Secondary market level information Interviews with buyers (brokers and lead firms), input suppliers, extension service providers
	Growth of tree fruit value chain	Increased production Increased productivity, Increased employment Increased sales Increased exports Improved inter-firm Collaboration	Secondary market level information Interviews with buyers (brokers and lead firms)

**Table 2: Baseline Sample Size**

Tree Fruit	Test	Control	Total
Avocado	250	250	500
Mango	420	349	769
Passion Fruit	354	324	678
Total	1,024	923	1,947

### Survey Sample Design

The original sample design was based on the total population of smallholders participating in (or targeted by) the Kenya BDS tree fruit and Fintrac HDC passion fruit activities by degree of participation (based on project documents and discussions with project staff, and discussion with intervention partners) and the population of smallholder farmers in similar geographic areas, but -- as far as possible -- outside the sphere of influence of the project.

From these populations a sample of participant and non-participant tree fruit farmers was drawn. Test respondents were drawn from participant lists provided by Fintrac HDC and Kenya BDS. This included participants covered by Fintrac HDC's passion fruit work out of their El Doret office; and eight Kenya BDS sub-components. These lists covered avocado, mango, and passion fruit farmers in Central, Eastern, Rift, and Coast Provinces. In finalizing the sample design, the project team decided to eliminate four Kenya BDS sub-components from the study -- KACE and Kenya Gatsby Trust/KWETU/KARI because they were not moving forward in their implementation; Ideal Business Link because the wide geographic dispersion of trainees and indirect link to smallholders made sampling problematic; and CDA because its remote location in the Tana River district of Coast province made data collection very expensive and logistically difficult, especially in the rain.

The original sample design was to include 1,380 participants and 1,380 non-

participants, but the final sample size was reduced to 1,024 participants and 923 non-participants for a total sample size of 1,947. The reduced size was the result of a decision to exclude project participants on the list who did not already have some passion fruit growing. (Many intended to start growing at some point in the future, but had not taken action to do so.) Those included in the sample were all of the farmers on the passion fruit project lists who already had at least five vines of passion fruit growing. The size of the control group was also reduced because the field teams could not find enough passion fruit growers in the relevant matched districts.

The study sample covered a total of 8 districts, 33 divisions, and 191 villages in Central, Eastern and Rift provinces as follows:

For Kenya BDS, the sample includes participants in four sub-projects. These included: participant avocado farmers in Kandara Division and non-participant farmers in areas of the same division; participant mango farmers in Makueni, Machakos, and Mbeere and non-participants in divisions of Makueni District that the project had not reached but where mangos are grown; and passion fruit growers participating in the project in Embu District and non-participating farmers in neighboring Kirinyaga District. Ministry of Agriculture and project officials were consulted in the selection of non-project, but similar, fruit-growing areas. For Fintrac HDC, participant farmers were selected from Uasin, Gishu, and Kieyo Districts, while non-participants were from non-project divisions of the same districts. Selection of the non-

participant sample continued until the survey teams could not locate any more eligible respondents in these regions.

## 2. QUALITATIVE STUDY OF THE TREE FRUIT VALUE CHAIN

The qualitative component of the impact assessment includes interviews with a small sample of value chain actors: smallholder MSEs, input suppliers, service providers, lead firm exporters, other buyers, and producer group leaders. The purpose of the qualitative component is to help understand the context of enterprise, household, and market level impacts and improve understanding of factors that encourage or inhibit the integration of Kenyan smallholder SMEs into the tree fruit value chain. Interviews were conducted at the baseline and will also be conducted in round two. The qualitative baseline findings have been summarized in analysis tables and these findings will be compared to the findings from qualitative research addressing similar questions in round two.

The baseline qualitative research was carried out over seven days in October 2004, just prior to implementation of the baseline quantitative survey. It involved in-depth interviews and focus group discussions with 50 actors in the avocado, mango and passion fruit value chains. This included 30 smallholder farmers, six producer group leaders, four input suppliers/stockists, one nursery operator, four extension agents,

**Table 3: Geographic Location of Sample**

Tree Fruit	Districts	Divisions	Villages
Avocado	1	1	30
Mango	3	17	57
Passion fruit	4	15	104
Total	8	33	191

three brokers, and two exporters. They were all linked to three sub-projects covered by the quantitative survey: EAGA (avocado), SITE (mango), and Fintrac (passion fruit)<sup>18</sup>. The qualitative research also involved interviews with the directors and field staff of the two projects. The questions focused on understanding incentives and risks for smallholders associated with upgrading and accessing new markets. It also considered the incentives and risks for exporters and input suppliers to provide solutions/services to smallholders. It looked at the nature of cooperation and coordination among actors within the value chain as it relates to smallholder participation and competitiveness, specifically, the extent to which lack of trust, power asymmetries, and cultural biases may be affecting smallholder participation, upgrading, and market linkages. The study also explored household level factors that affect smallholder participation in the value chain.

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<sup>18</sup> The brokers interviewed for the qualitative research operated in the geographic areas covered by the EAGA sub project and used to buy avocados from project participants.



### III. BASELINE RESEARCH FINDINGS

#### A. THE TREE FRUIT VALUE CHAINS

Within the horticulture sector in Kenya, avocados, mangos, and passion fruit are among the most common fruit crops grown. Mangoes are grown primarily along the coast and other low land areas, while avocado and passion fruit are cultivated primarily in the highlands. While most of these fruits are produced for home consumption or sale in traditional markets, recent data suggest their growing role among exports and as a source of foreign exchange. These three fruits make up the top three fruit exports from Kenya – comprising 85% of fruit exports in 2003 (Table 4). Hass avocados are exported primarily to Europe (many are shipped to Marseilles for sale in France and Germany); Fuerte avocados to the Middle East; mangos to Dubai; and passion fruit to specialty markets in Europe, especially France. On average, growth in the volumes and earnings for fruits is higher than for horticulture as a whole; tree fruits in particular are seen as an alternative to primary commodities like coffee and tea as export crops, given uncertainties and trends that place Kenya at risk in these markets.

Exports of mangos and avocados started in the 1980s and in 1990, respectively. While mangos have long been grown for home consumption, new export varieties were introduced in the 1980s. Avocados were introduced primarily as a cash crop for export in the 1990s. Passion fruit has a long history of cultivation in Kenya. It was introduced in the first half of the 20<sup>th</sup> century but due to disease never took off as an export crop. It is grown primarily for home consumption, with some limited sales in domestic, regional, and export markets.

#### 1. DEMAND

Smallholders are the by far the major producers of tree fruits in Kenya. Most of the avocados, passion, and mangos produced by smallholders continue to be sold in domestic markets. However, all three fruits are important exports crops and they are growing in importance.<sup>19</sup> Some points with regard to the demand for Kenyan tree fruits in the export markets:

##### Avocado

Avocados are an important horticultural export crop in Kenya, comprising approximately 75 percent of fresh fruit exports recorded by HCDA in 2003, and 14 percent of all recorded horticulture exports. Moreover, avocados and tree fruits in general are growing in importance in the export market.

Kenya is not among the main suppliers of avocados in the world market. The top suppliers in rank order of importance include Mexico, Chile, South Africa (the main competitor for European and Near East markets), Spain, Israel, and a mix of other countries such as the Dominican Republic and Indonesia. To give a relative sense of volumes produced and exported in 2003, Mexico, the top supplier, produced approximately one million metric tons and exported 135,000 tons; South Africa produced 70,000 tons and exported approximately 38,000 tons; and Kenya exported approximately 20,000 metric tons (USDA, 2005)

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<sup>19</sup> Between 2002 and 2003, HCDA data shows that the volume and value of tree fruit exports in Kenya grew at higher rates (17 percent and 36 percent, respectively) than the rates for horticulture exports as a whole (10 percent and 8 percent, respectively) (HCDA 2003)

The export market for avocados is large, but competitive. In the past, Kenya has supplied primarily Fuerte avocados, a large, smooth skinned variety with somewhat limited demand to the Middle East. However, Hass avocados, which are a smaller, rough skinned variety, are favored in the European export markets because they are disease resistant and less risky to ship.

According to one main exporter (EAGA), one million boxes of avocados are exported from Kenya each year and they supply one quarter of this amount: 250,000 boxes per year, including 20% Haas and 80% Fuerte varieties. Haas avocados are sold primarily to Europe and Fuerte are sold primarily to the Middle East. According to this exporter (EAGA), Kenya avocados have a tarnished reputation in export markets due to past shipments of diseased fruit and mistiming of shipments that resulted in fruit being either under-ripe or spoiled. EAGA, a large horticulture export firm in Kenya, sells mostly to the speculative market and, more recently, to wholesalers with links to supermarkets. It is also penetrating fair trade markets, where the price premium is 12 percent.

The local market, to date, has primarily involved wholesale and retail fresh fruit markets. In addition to these markets, a local investor is re-opening a factory that will process avocado oil in Central Province (in an area not far from Nairobi and close to the avocado groups facilitated by Kenya BDS). It is anticipated that this firm will buy lower grade avocados not suitable for export or sale in the domestic fresh fruit market. This will provide an incentive to smallholders to grow avocados and increase their sales and income.

**Table 4: Export Statistics for Avocado, Mango and Passion Fruit, Kenya 2003**

Fruit	Volume		Value	
	Kgs.	Metric Tons	KSH	USD*
Avocado	19,020,028	19,020	892,871,043	11,787,076
Mango	2,226,550	2,227	273,611,917	3,612,039
Passion Fruit	1,505,630	1,506	393,783,047	5,198,456
All fruit	60,982,885	60,983	1,752,645,572	23,137,227
All horticulture	133,232,517	133,233	28,839,583,186	381,380,063

Source: GOK, 2003 \* Ksh. 75.75 = USD\$ 1 as of Dec. 31, 2003

The main competitive advantage of Kenyan avocados is their availability in late January and February when the supply of avocados from other countries is low (counter-seasonal supply). It has a four-week jump on South African avocados – a main competitor -- in the world markets.

### Mango

In the context of a highly competitive world market for mangos, Kenya is not a major player. Kenyan mangos have a somewhat flawed reputation because of poor quality. Deliveries of diseased and spoiled fruit in the past have made buyers wary. Improved, disease resistant varieties were introduced in Kenya about 8 years ago, but are still relatively new. Kenyan mangos have not yet made major inroads into the European markets and are sold primarily in the Middle East. However, these countries place restrictions on mangos from Kenya due to a history of weevils. If they find one weevil in a container, the whole container is thrown out and exporters lose the value of the entire container.

Nevertheless, there is potential for further development of mango exports, especially for the apple mango. There also appears to be potential for developing the industry through branding; how-

ever, these efforts are still very under-developed.

### Passion fruit

The passion fruit market is unique among these three fruits in that there is unmet demand in both domestic and export markets. At this point, while passion fruit is grown in countries throughout the world, no one country appears to have the competitive edge with passion fruit. Zimbabwe was a competitor in producing and exporting passion fruit in previous years, but land redistribution activities in recent years have disrupted production. Both fresh and processed passion fruit (e.g., juice concentrate) are seen to have significant, but as yet untapped, potential in world markets. It is a specialty market, however, and considered to have less mass based appeal as a fresh fruit than as a pulp used in marinades, sherbets, and juice. Passion fruit has many positive attributes: it is easy to ship and a high-value crop. Most of the fresh passion fruit exported from Kenya goes to Europe, especially France.

The research found a regional value chain for passion fruit extending from Kenya to Uganda. Kenyan passion fruit is in high demand in Uganda at certain times of the year (October through December). There is a ready market in Kampala for fresh fruit and juice sold in hotels and restaurants. Household con-

sumption is also up in Uganda because it is seen as a healthy drink, especially for people affected by HIV/AIDS. RI staff in Kampala interviewed brokers selling Kenyan passion fruit in the local market and found it to be a highly lucrative market. The Ugandan brokers are seasonal buyers – they come only during the off season for passion fruit in Uganda and Rwanda.

HCDA buys the highest grade passion fruit, which it sells to exporters in Nairobi.

In terms of domestic demand, producers historically supplied passion fruit to a government-supported passion fruit processing factory located first in Kitale, then in Sotik, and finally in Thika before it closed down a few years ago in part due to lack of supply. This may in part relate to the fact that prices in export markets are much higher (Ksh. 50/kg) than local prices for juice grade passion fruit (Ksh. 7-15/kg). Moreover, passion fruit has not been actively promoted.

In sum, the competitive advantage of Kenya tree fruits is not volume, quality, or price but rather seasonality.<sup>20</sup> Avoca-

<sup>20</sup> See Steven Jaffee (2003). "From Challenge to Opportunity: Transforming

dos, mangos, and passion fruit each have a 'window' when these crops are less available from other suppliers. Another advantage that Kenya has in horticulture in general is that it is better set up to meet certification standards than other countries. Considerable efforts have been made to encourage exporters to work with smallholders through MOA, HCDA and a number of bilateral donor-supported projects.

## 2. SUPPLY CHAINS – PRODUCERS TO MARKETS

Producers to markets: overview of the tree fruit value chain

Figure 3 shows key actors in the tree fruit value chain in Kenya and how they are related.

Tree fruits are produced primarily by smallholders and medium-sized growers. Small-scale chemical stockists (referred to as agro-vets) sell fertilizers, insecticides, and other chemicals to producers through privately owned shops located in towns throughout Kenya. Many of these shops also offer advice to farmers on what chemicals to use as well as their proper application and safe handling. Big-name chemical wholesalers (such as Bayer) provide periodic training for stockists and farmers to raise awareness of the benefits of using their products. This training is provided through existing farmer groups and meetings organized by lead farmers in local communities. Publicly supported agricultural research centers and government organizations, such as the

Kenya Agricultural Research Institute (KARI), the Horticulture Crops Development Authority (HCDA), and the Ministry of Agriculture (MOA) produce and distribute tree fruit plant stock. They link to farmers through demonstration centers and farmer groups. Private nurseries also have begun to produce and sell tree fruit plant stock.

The main marketing outlets for tree fruit producers are traders and brokers, who in turn sell to both domestic and export markets. In the domestic market, they sell to domestic wholesalers, fresh fruit retailers, and small retail shops. Producers also sell directly to fresh fruit retailers and to HCDA. Brokers and traders are the main conduits for smallholders to the formal and informal processing plants and to exporters who buy tree fruits. Medium-scale growers often link directly to processing plants, local supermarkets, and exporters. Exporters buy tree fruits produced by smallholders and medium-scale farmers and also produce some fruit on their own plantations.<sup>21</sup> Exporters have just recently begun to buy directly from producer groups and to provide embedded services to smallholders through these groups.

### Key Problems in the Tree Fruit Supply Chain at the Time of Baseline Research

Constraints to smallholder participation in the tree fruit value chain include:

- Lack of information and knowledge of the markets
- Limited access to inputs
- Limited smallholder access to business solutions and services
- A long and inefficient supply chain with poor vertical and horizontal linkages. Small producers are not well organized in terms of access to inputs and markets; buyers face high transac-

tion costs when purchasing fruit from dispersed smallholders.

- Lack of trust among producers, brokers, and exporters, related to problems in the past in the enforcement of supply contracts; from the perspective of producers, buyers are not always dependable or honest.

These constraints result in low yields (especially of export quality varieties), low quality, low sales volumes, low selling prices, high rejection rates, and excessive post harvest waste – all of which affect the competitiveness of Kenyan fruits in export markets.

Historically, smallholders in Kenya have grown tree fruits largely for home consumption or small-scale local trade. They have not considered tree fruit a major cash crop or a business activity to invest in. A repeated theme in the qualitative research is that these crops that have not been taken seriously in the past.

### Avocado

Avocado production in the Kandara area experienced almost total collapse in the 1990s as a result of several factors:

- Disease, specifically anthracnose, which causes black spots on the skin of avocados
- The collapse of the government parastatal that bought avocados prior to the liberalization of the economy
- The related collapse of a private sector plant to process low grade avocados into oil
- A tarnished reputation in export markets due to the poor quality of Kenyan avocados and the mistiming of deliveries resulting in spoiled fruit.

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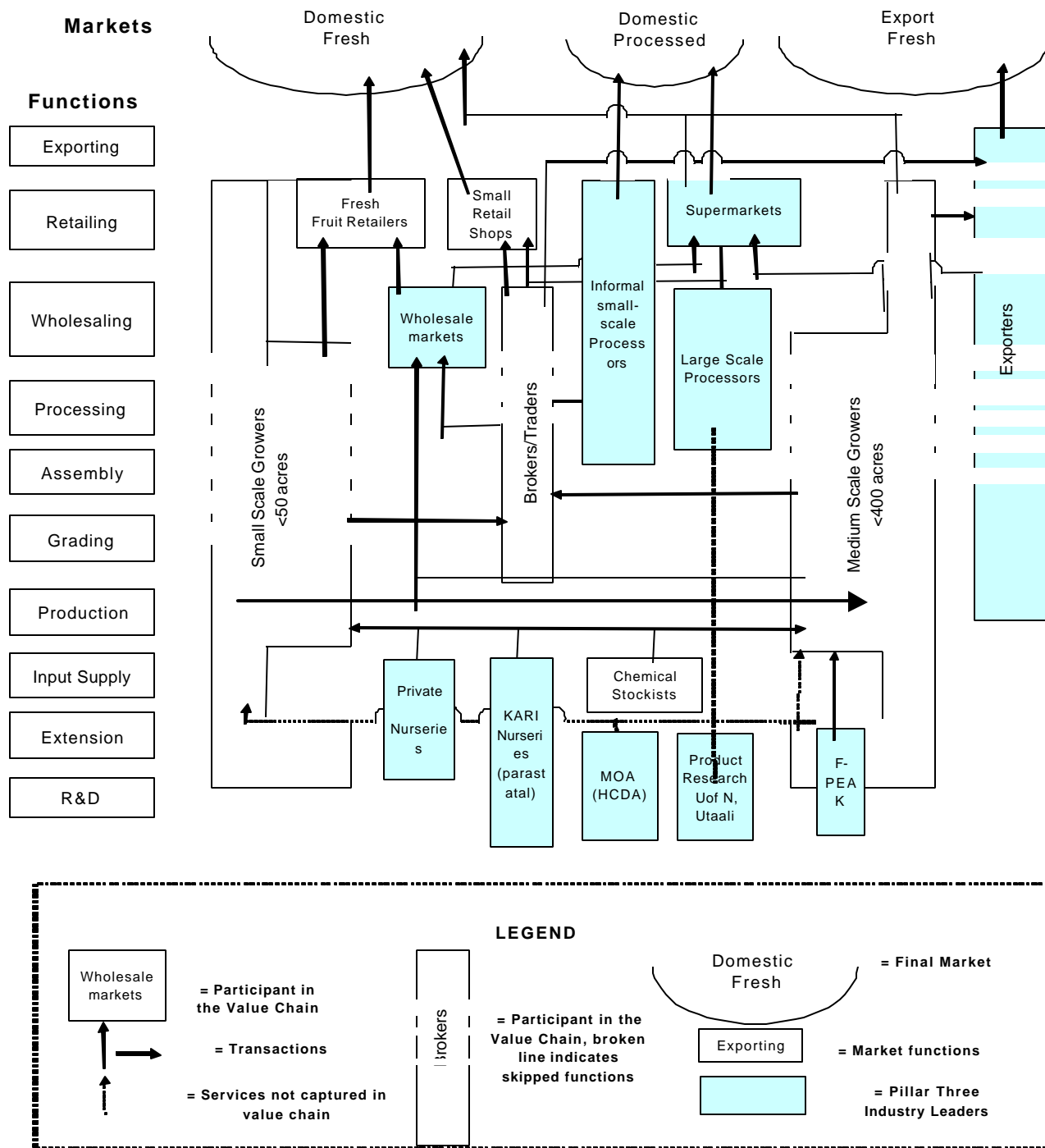
Kenya's Fresh Vegetable Trade in the Context of Emerging Food Safety and Other Standards in Europe." Agriculture and Rural Development Paper 1. World Bank; Steven Jaffee and Spencer Henson (2004). "Standards and Agro-Food Exports from Developing Countries: Rebalancing the Debate." World Bank Policy Research Working Paper 3348.

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<sup>21</sup> We were able to get very little information on this.



**Figure 5: Kenya Tree Fruit Value Chain<sup>22</sup>**



<sup>22</sup> From: Kula, Olaf, "Activity Status Report: Holding Hands with Folded Arms: Upgrading Kenya Tree Fruit Value Chains". Deloitte, Touche, Tomatsu, No date.

Brokers continued to purchase avocados during these years, but in limited volumes and at very low prices (50 cents to Ksh.1 per piece). Because of disease and neglect of trees, the fruit produced was poor quality. Most farmers grew Fuerte avocados, which are in demand in the Middle Eastern markets, but less so in European markets

Resulting problems in the supply chain include:

- Supply of low quality fruit by producers (diseased or damaged due to “climb and shake” picking practices)
- Supply of ungraded fruit
- Supply of Fuerte avocados, a variety more vulnerable to disease and with little demand in the European export market
- Limited incentives for producers to upgrade because of low farm gate prices paid by brokers
- Wastage of lower grade fruit due to lack of oil processing facility
- Limited emphasis on inputs and services related to avocado production and upgrading by government or private sector
- Limited information on how to prevent disease
- View among producers that avocados do not have good potential as a cash crop.

## Mango

Mango production in the areas of Eastern province covered by the study is

**Avocado:** “I believe there is a way they [brokers] talk to these exporters in a way that we do not.... So they could even buy from us at a very low price telling us that the market is bad. Brokers created a barrier between the exporters and us, so we as farmers became like blind men because we could not tell what the exporter had to say.”

-Kandara avocado grower

spread out. Marketing is a key problem facing producers. Farmers have few market outlets and are dependent on brokers who come to their farms to pick the fruit. They buy at low prices, only buy the best fruit, and do not sell on contracts. In general, the mango farmers in these areas lack bargaining power with brokers and feel exploited by them.

Key problems in the mango supply chain include:

- Drought and lack of irrigation
- Disease
- High price of chemicals to improve quality
- Lack of credit to help cover costs of complying with international standards (chemicals, protective clothing, digging wells, insecticides, sprayers).
- Limited supply of newer varieties with more market potential
- Limited incentives among mango producers because of low prices and erratic market

A mango producer group leader in Masii describes the problem of linking producers to buyers:

... if you get a good buyer like the one I said [Mombassa exporter] then it's a challenge because they [the farmers] cannot meet the required standards. When you try to tell them to meet those standards, it's when they give you things like, "we cannot afford these chemicals, and we can't afford these standards because we have no money." So you get a challenge because you are torn between two forces one is the expectation from farmers, which they expect you to find them good market and when a buyer who needs standards comes he finds that farmers cannot meet the standards you see the two forces. (a lead farmer, Masii)

## Passion fruit

Passion fruit is widely produced, but treated primarily as a garden

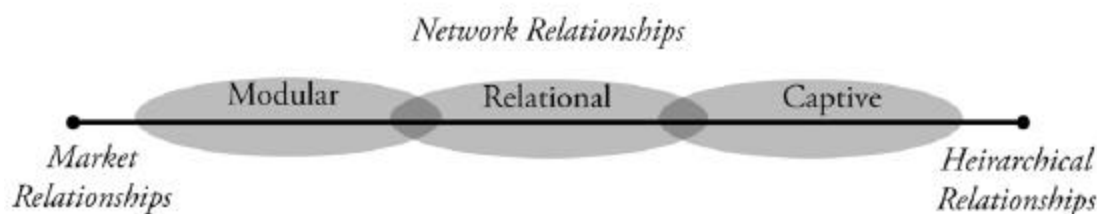
crop for home consumption. While there is unmet demand for passion fruit in domestic, regional, and international markets, the vulnerability of passion fruit to disease and the lack of technical know-how to manage and prevent disease have limited the ability of farmers to produce the volumes demanded.

The low volumes produced relate to a disease that attacks the roots of vines, reduces yields, and kills the plants. Efforts to grow large volumes of passion fruit on plantations in Kenya in the 1940s and 1950s were thwarted by rapid spread of disease. This disease has periodically wiped out Kenya's passion fruit root stock. Waves of disease over the years have relegated passion fruit mostly to a dispersed garden crop (the risk disease is lessened if plants are spread out).

Because of its vulnerability to disease, passion fruit involves more technical management than avocados or mangos, especially if the aim is to reduce disease and have the plant bear fruit all year long. Grafting purple passion onto yellow passion root stock is one way farmers can reduce the risk of disease. Another issue for this fruit is the safety of some chemicals that are used to control disease and keep the plants flowering, especially if there are residuals on the fruit at time of sale.

Another challenge is the seasonal nature of the market for fresh passion fruit, with fluctuating demand during the year. Passion fruit has potential for year-round production if managed properly, but farmers have little incentive to increase production due to low demand in certain seasons. Currently, there is no passion juice processing facility to buy passion fruit in the off seasons and the fruit rots.

Figure 6: Governance Continuum



### 3. GOVERNANCE PATTERNS IN THE TREE FRUIT VALUE CHAIN

The relationships among firms in the tree fruit value chain reflect different types of governance patterns. Dunn and Villeda (2005), describe three general types of governance patterns:

- *Market relationships* characterized by arms-length transactions and little information exchange between firms. Firms in market relationships may engage in repeat transactions, but their interactions are limited to the exchange of goods or services for money.
- *Network relationships* characterized by more extensive information flows between firms than in market relationships. Some firms in the chain exert a degree of influence or control over the operations of other firms in the chain (Humphrey and Schmitz 2000). Suppliers in network relationships typically supply products according to buyers' specifications, including what is to be produced, when it should be available, and how it should be produced.<sup>23</sup>

<sup>23</sup> Network relationships can be broken down further into modular governance (suppliers provide information but not process technology), relational governance (buyers and suppliers rely on idiosyncratic, face to face interactions, relationships often based on trust derived from social and/or ethnic ties, spatial proximity, or reputation) and captive governance (single buyer and provider

- *Hierarchical relationships*: value-added functions that are vertically integrated under the ownership of a single firm. An example of a hierarchical relationship in a global value chain would be a retail chain in one country that manufactures products in facilities it owns in a different country.

All of these governance patterns have trade offs and one is not necessarily better than another for value chain actors.

The tree fruit value chain is characterized by a mix of market and network relationships. The horticulture sector has had limited government involvement and private firms have been active and competitive – this differs from the pattern of hierarchical relationships that characterize some other commodity value chains in Kenya -- for example, coffee, tea, and pyrethrum, for which government marketing boards still control procurement and producer prices. As producer groups form to link to inputs and markets, and as exporters form associations, the patterns are shifting more toward network relationships.

#### Findings from the Qualitative Research on Governance Patterns

##### Avocado

Before EAGA/Kenya BDS started to work in Kandara, brokers played a dominant role in the value chain. The

of process technology, asymmetric relationship).

relationship between brokers and producers was arms-length, with minimal exchange of information and no assurance of repeat transactions. Producers do not fully trust brokers to be fair, to come at the right time to pick the fruit, or to

come at all. In general, they feel an imbalance in the relationship. Brokers have a somewhat closer relationship with their buyers. There is a better flow of information regarding product specifications and price. Many brokers have long-standing relationships with wholesale and export buyers, and some even are said to pay kickbacks to assure access to these markets. Some producers expressed the feeling that brokers (who are ethnically similar to the producers) have a knack of talking to the exporters, who are primarily Asian, in the right way.

The Kenya BDS/EAGA project links producers directly to EAGA's export market through the formation of producer groups. The producer groups have negotiated a Memorandum of Understanding (MOU) with EAGA to supply avocados that meet EAGA specifications in return for embedded services (spraying, sorting, grading, and transport). This direct relationship marks a significant change in the avocado value chain in Kandara. In this context, a number of governance issues related to trust, power asymmetries, socio-cultural biases, and information flow are noteworthy.

Most farmers expressed trust in EAGA as an organization, but some were mistrustful of some EAGA staff buyers who have continuing relationships with brokers (who now source avocados from other areas) and who, they say, have enjoyed kickbacks from the brokers in the past. These buyers tend to

reject a lot of the avocados from the groups – claiming they do not meet grading standards; however, farmers believe it is an excuse to reject their fruit so they can continue to buy from the brokers. Some farmers also expressed mistrust of other producer group members, who they say are continuing to sell avocados “secretly” to brokers when they need fast cash. This is in violation of the MOU. Some growers say they do not fully trust the reliability of EAGA to spray on time, pick up on schedule, or use consistent grading standards. In addition, during the first year, the growers were not all clear as to how the prices for their fruit would be determined – they thought the prices would fluctuate according to the market when they were actually fixed for the season.

Issues of trust also arise in the relationship between industry leaders (in both avocados and mangos) and government. Although they communicate with each other, their relationship has been described as fragile. This is due in part to the widely held belief that private sector leaders look after themselves, while the government looks after smallholders (Kula, no date). Some producers believe that EAGA buyers change grading standards based on the volumes they need at a particular time, not a standard protocol.

In terms of power asymmetries, both the avocado producers and the brokers feel that exporters call all the shots in terms of volumes purchased, prices, grades, timing, and contract terms.

In socio-cultural terms, the producer groups and brokers are ethnically homogeneous but the exporters are primarily Asian. Age seems to be a factor – the producer groups tend to be dominated by older members, primarily retired men. In many cases a man is registered as the member but his wife is the active group participant. Payments are made in the name of the man. Older

members commented that young women do not participate because of time constraints and because they consider farming and farmer groups as activities for older women.

In terms of information flows, the biggest complaint was from farmers who believe that they did not have good information on export prices and that both Kenya BDS and EAGA were holding back price information. Some farmers also felt that information on the MOU negotiations regarding prices between the groups and EAGA did not flow from producer group leaders to members. This was an issue during the first year of the project.

In sum, there is a moderate level of trust in the avocado value chain between Kandara producer groups and the exporter. The balance of power is still with the buyers, but growers are slowly increasing their power. Men tend to dominate the leadership of the producers groups, but women are active members. While there was some sense among members that they do not know everything that is going on in their groups, most expressed satisfaction with the groups and how their leaders managed them. Moreover, the Kenya BDS staff person, a young woman from an area not far from Kandara, is well respected by all despite her age and gender. At this point, there appears to be cautious optimism on the part of EAGA and the farmers about the direct linkage.

### **Mango**

Relationships in the mango value chain had not significantly changed as a result of the project at the time of the baseline. Some farmer groups had formed in the project areas, but they had not yet forged new linkages to input, extension, or product markets. Most growers were selling their mangos individually to a wide array of unknown brokers and traders – suggesting a value chain gov-

ernance pattern of “market relationships.”

The qualitative research found a high degree of mistrust in brokers among mango farmers. Brokers were described as “outsiders”, “little known, and “not to be trusted.” Some farmers felt brokers lied to them about what they were paying other farmers. Most payments from brokers are made in cash; some farmers expressed concerns that the brokers might come back and steal it from them. Larger farmers tended to have better communication and more trust with brokers, and even direct links to exporters whom they trusted. Several farmers talked about the challenge of trusting other producer group members to stick to certain agreed upon prices. Because each farmer sells from his/her own homestead and because there are no central collection points for mangos, prices are negotiated one on one, with little communication between farmers. Farmers expressed confidence that the leaders of their producer groups would represent their interests.

In terms of power asymmetries, mango farmers expressed the view that brokers dictate prices, when they buy, how much they buy, and what they buy. Timing is especially important for mango farmers, as over-ripe or under-ripe fruit commands a lower price. Brokers control the timing.

In terms of socio-cultural biases, one of the biggest issues with mango farmers is that brokers are “outsiders.” Men ap-

**Mango** “... The market has just become bad ... for things sold outside to people who are strangers...it is like they are mixed up and one can detect some fishy business in them as it is not straight.”  
-Mango Farmer, Masii



**Avocado** (*Persea Americana*) originated in south-central Mexico, sometime between 7,000 and 5,000 B.C. But it was several millennia before this wild variety was cultivated. Archaeologists in Peru have found domesticated avocado seeds buried with Incan mummies dating back to 750 B.C. and there is evidence that avocados were cultivated in Mexico as early as 500 B.C.

(from: [www.avocados.org](http://www.avocados.org))

pear to dominate the producer groups while women play an active role in mango production and sales on their farms. Farmers in the project areas are from the same ethnic groups, while exporters are primarily Asians.

Brokers and other buyers do not offer information to farmers on standards required. They do not reveal whom they are selling to for fear producers will develop direct links. Producer group leaders provide information on mango buyers and prices to group members and the groups provide a good forum for information exchange. In general, however, producers have barriers in gaining market information (prices brokers are paying) due to their geographic isolation. The fact that brokers come to individual farms with their own pickers to buy mangos reduces information flows and the negotiating power of farmers.

In general, there is a low level of trust in the value chain and the balance of power, from the perspective of farmers, is with buyers, mostly brokers. The lack of central collection points for mangos and the dispersed settlement patterns of farmers is a key constraint to the flow of information.

### Passion Fruit

The farmers interviewed in the qualitative research were already growing relatively large volumes of passion fruit. In

previous years they sold it to a large-scale farmer/politician who had an export firm selling flowers and passion fruit in European markets. A few years ago his business closed for a combination of political and economic reasons, leaving the farmers with limited alternative markets for their passion fruit. Around this same time, a passion fruit processing plant based in Thika also closed down, compounding the problem. Since then, farmers have

sold their passion fruit to two main outlets: (1) the HCDA, a government sponsored organization promoting horticulture development and buying up horticulture products that are sold in export markets; and (2) Ugandan brokers who cross the western border into Kenya area every week to buy from farmers in the El Doret area.

Thus, the governance pattern for at least part of the value chain (those selling to Ugandan brokers) is characterized by a shift from a somewhat 'captive' network towards a more open market relationship (moving to the left on the continuum in Figure 1). At the time of the baseline, project activities were just beginning and had not affected this pattern.

In terms of *trust*, the research found a general sense of trust and cooperation among producers and between producers and brokers. While women producers had a great deal of trust in the Ugandan brokers, they did not trust input suppliers to sell them safe and effective chemicals.

There are *power asymmetries* in the value chain. Women do much of the production and are responsible for selling passion fruit from their farms or central collection points. The qualitative research found that women had organized informal groups to sell to Ugandan bro-

kers, and had good bargaining power on prices during the high demand season. In previous years, the farmer/politician played a very powerful role in passion exports, but his departure left a vacuum.

In terms of *socio-cultural* issues, the Ugandan brokers are all Muslim men while the producers are mainly Christian women, but this cultural difference has not affected the quality of their relationship, which appears to be excellent. The Ugandan brokers even bring Ghanaian cloth to the women farmers from Kampala. They are in frequent contact with each other via mobile phone and meet once a week on the farm of the woman who leads the informal group (and offers her farm as the central collection point). One social divide in this value chain is gender. Men dominate the formal activities of the passion fruit groups, while women do most of the production and selling. Men go to all the training on passion fruit, grafting, and application of chemicals, even though it is women who do all the work related to passion fruit. Women expressed fear and lack of understanding about chemicals to prevent disease – historically a major problem in that area. They also expressed considerable lack of trust in small input suppliers in the area to direct them to safe and effective chemicals.

Information flows on price have been facilitated by mobile phone contact with buyers and by HCDA posting their prices on a weekly basis. This price information flows to farmers through the farmer groups. Information on export certification standards, approved chemicals, and improved production techniques flow to men through training but they do not transfer it to women, who are the main producers. The research found in some cases information that group leaders had did not get transferred to other group members.

In general, there appears to be a high level of trust and cooperation among actors in the passion fruit value chain (except that agro-stockists supplying chemicals are not very active or knowledgeable about passion fruit). Overall, there seems to be a fairly good balance of power within this chain between producers and buyers.

#### 4. INCENTIVES AND DISINCENTIVES TO UPGRADING

Upgrading can be defined as “innovation that increases value added” (Giuliani, Pietrobelli, and Rabellotti 2004) and can take five forms:

1. **Process upgrading:** an increase in production efficiency, resulting in either a) greater output for the same level of inputs or b) the same level of output for fewer inputs. Process upgrading can involve improved organization of the production process or improved technology.
2. **Product upgrading:** a qualitative improvement in the product that makes it more desirable to consumers and commands a higher unit price;
3. **Functional upgrading:** the entry of a firm into a new, higher value-added function in the value chain; functional upgrading moves the firm closer to the final consumer and positions it to receive a higher unit price for the product;
4. **Inter-chain upgrading:** the entry of a firm into a new and more lucrative marketing channel in the value chain such as moving from the domestic to the export market for the same product;

5. **Inter-sectoral upgrading:** using knowledge gained in one value chain to move into a new value chain or product line, involving a completely different product or service.

Both the Kenya BDS and Fintrac HDC projects facilitate activities to promote upgrading of tree fruits, primarily product, process, and inter-chain upgrading. The aim is to improve the capacity of smallholders to respond to changing market demand and increase rural incomes. The baseline research identified specific forms of upgrading in the tree fruit value chain and the views of producers and other actors in the value chain on the incentives and disincentives to upgrade. These findings are discussed below and will be compared to findings in the second round of qualitative research on changes in upgrading and how they are related to project interventions.

#### Upgrading Avocados

Opportunities for upgrading in the avocado industry can be pursued in several ways: by improving quality; promoting improved varieties; expanding market outlets; and complying with certification standards.

Higher quality fruit can be produced by reducing the incidence of anthracnose, a disease that leaves cuts and black spots on the skin of Fuerte avocados (the variety traditionally produced in Kenya). This disease is prevented through a spraying regime that must be carried out at appropriate intervals during the growing season. The key incentives are that this will increase the yield of high-grade fruits. The disincentive is that it takes time, expertise, and money to buy chemicals, spraying machines, and hired labor. If the spraying is not done at the right time, the investment is lost. Moreover, Fuerte avocados get a lower price than Hass avocados.

Another form of avocado upgrading is to grow an improved variety of fruit, specifically, Hass avocados. The incentive to upgrade to Hass is that it is disease resistant, easy to ship, and in high demand in the export market. It is the most popular and common variety of avocado in the world and grows well in Kenya. It is more tailored to the export market and commands a higher price than Fuerte or other varieties. A constraint to this form of upgrading is that newly planted Hass avocado trees take 4-5 years before they fruit. An alternative approach is to graft Hass avocados onto Fuerte avocado trees (most avocado producers in Kandara have Fuerte trees that they planted in the 1980s and 1990). However, the grafting process requires technical expertise and diligent care – proper grafting techniques, spraying, fertilizer application, pruning, picking the right way, and picking at the right time. EAGA and Kenya BDS have facilitated this process quite successfully in Kandara, and many farmers are now successfully producing Hass avocados.

Avocado upgrading also can involve selling to new market outlets. In Kandara, through the EAGA sub-project, producers link directly to exporters through producer groups. The groups sign agreements to sell exclusively to the exporter in exchange for embedded services, including spraying, assembly, grading, and a centralized payment system managed by the group leaders. Each producer is responsible for picking their own fruit and delivering it to a collection point. Farmers are paid through their groups, with deductions made for the costs of spraying at the time of payment. There are a number of incentives for this direct linkage. Producers have a secured market and a negotiated contract price. The prices they receive are higher than those paid by brokers. Farmers have access to spraying on credit, and access to training in improved production techniques. The spraying service provided through the

exporter saves the farmers labor time, organizational responsibility, and hassle. They are able to access the expertise of EAGA and it does not require an up front capital outlay. The exporter is assured high quality fruit and the use of approved chemicals.

There are also some constraints to this direct market linkage. Organizing the farmer groups can be challenging and time consuming. EAGA is used to sourcing crops from small holders with shorter production cycles (e.g., French beans) and there is ongoing pressure from management to see more immediate bottom line results than is possible with avocados. For farmers, the prices are negotiated ahead of time, and may be lower than the market price. They run the risk that EAGA may not take all of their fruit, yet their MOU with EAGA limits their options for selling to others and decreases access to these buyers. There is also the risk that EAGA may miss their spraying or pick up schedules, with associated risks and costs to farmers. Producer group leaders subsidize the process, and do not get paid. While farmers have issues with the brokers, some of them have played a support role that some farmers miss (one farmer referred to the fact that a broker used to give him advance payments when he needed money to pay school fees). Moreover, brokers used to provide labor for picking – a function that farmers now have to assume individual responsibility for.

Another form of inter-chain upgrading involves selling to an avocado oil processing plant that will be opened in the Kandara area. This plant was built years ago but closed down when the avocado market collapsed. With the revival of avocados in the area, the original owners now have plans to reopen this factory. This will enable avocado producers to sell their whole crops, even the

lower grade fruit that does not meet buyer standards. The prices would be low, but the farmer would at least get something. The advantage of this for producers is that it diversifies the market; for exporters, farmers are likely to stay with the crop even if they have periodic problems in quality or marketing because they will at least get something. It is not certain that the plant will open, and farmers are a bit unsure how their avocados would be delivered to the factory (and the cost).

Upgrading can also include meeting certification standards required in export markets, specifically those being intro-

**Mangos** originated in India and have been cultivated there for over 4,000 years. Mangos are grown in the tropical and sub-tropical lowlands of the world, and consumed throughout the world. Persian sailors introduced mangos into East Africa in the 10<sup>th</sup> century AD. They subsequently spread to West Africa and South America in the 17<sup>th</sup> century by the Portuguese. Mangos are rich in vitamins A and C and are the most consumed fruit in the world.  
(from: [www.mangos.com](http://www.mangos.com))

duced by EUREPGAP. This process involves a variety of actors on the value chain – farmers, input suppliers, extension workers, producer groups, exporters, importers, and auditors. The EUREPGAP requirements are quite stringent - they require soil and water testing, exclusive use of approved chemicals, proper application of chemicals, use of protective clothing, proper storage, documentation of chemical use, storage and handling, and tests for chemical residuals. Training in EUREPGAP standards was ongoing in Kenya at the time of the baseline, in anticipation of the introduction of these standards (which are actually voluntary)

in 2005. For producers, the incentive to comply with these standards relates largely to accessing export markets; however, these practices also improve productivity and environmental and occupational safety and produce higher quality fruit for domestic sale. For exporters, smallholder compliance is challenging to monitor and document, but the incentive is to maintain and/or improve competitiveness in export markets. The main disincentives to producer compliance are lack of capital to finance costs associated with regular soil and water testing, building and maintaining structures for collection and storage, and buying capital equipment (such as charcoal coolers) and protective clothing. The risk to all is if, after all the effort and investment, the standards are not really enforced in the export markets. In this case, other countries that do not comply may beat them out in the market.

### Upgrading Mangos

Like avocados, mangos can be upgraded by introducing new varieties, improving production techniques, improving business practices, complying with certification standards, and linking producers more directly to exporters.

Several *new varieties* of mango have good market potential in both export and domestic markets. Upgrading to these varieties can give producers a competitive edge. However, it takes four years for new trees to bear fruit. Because the future demand for mangos is uncertain and competition from other countries is high (more mangos are produced in the world than any other fruit) farmers take a risk in investing in new trees. Grafting can shortcut this process but requires technical input. Another risk of growing new varieties is that some of them (Apple and Sensation) are very sensitive to the amount of



**Purple passion fruit** originated in southern Brazil and is grown in other parts of Latin America, Hawaii, Australia, New Zealand, Asia, and Africa. Passion fruit was introduced into Kenya and Uganda in the 1930s and originally was grown on plantations, but disease spread quickly in the plantations and it became relegated to a garden crop. Passion fruit has many uses – the pulp is used in juices and dessert sauces, juice is given as a digestive stimulant and treatment for gastric cancer; chemicals extracted from air-dried passion fruit leaves are used as a sedative or tranquilizer; seeds are pressed to produce a fragrant moisturizing oil.

-Morton, 1987

rain that falls in the mango growing areas of Eastern province.

Improved production techniques for mangos involve spraying, fertilization, cleaning out brush and debris under the trees, and pruning the trees into the shape of an umbrella. The key incentive for adopting these techniques is higher quality fruit with better market potential. The constraints to adopting these practices include limited access to chemicals due to their high cost, limited knowledge of proper chemical use on mango trees by farmers, lack of training geared to the appropriate learning level of farmers, and lack of service providers who are trained to do the spraying. Farmers face the risk of losing their investment in chemicals and labor due to lack of markets, low yields, or bad weather (mangos fall off the trees if they dry out in a drought). Another constraint is that stockists often change the chemicals they supply, and farmers are unsure of which new ones will work.

Selling to new market outlets is another form of upgrading. For mango producers this could involve selling to mango

processing plants (dried mango) which would diversify their sales and provide a market for the lower grade fruit that is rejected by other buyers. The main disincentive is that no processing plant exists at this time near the project area, although farmers had discussed plans by some investors to build such a plant. Another form of upgrading is to create a direct link between growers and mango exporters – a model that the SITE sub-project is promoting among mango farmers in its project areas. SITE is linking mango farmer groups to training in mango farming as a business and process upgrading. They also are working to identify mango exporters who are willing to develop supply contracts with

the farmer groups; and input suppliers and spraying service providers who are willing to provide services on a contract basis and get paid from exporters or producer groups when the crop is sold. The incentive to farmers is that it would give them a more reliable market, fairer/negotiated prices, and allow for payments directly to their accounts (cash payments are risky). They would have access to expertise related to chemicals and spraying. Exporters would be assured higher quality fruit and farmers higher prices with these inputs. Input suppliers and service providers would have a steady clientele. The disincentive is that the exporters are reluctant to sign contracts, preferring verbal agreements (that the farmers don't trust). SITE has found it challenging to identify exporters willing to link to the farmer groups, or input suppliers willing to take the risk of providing inputs and services in advance of payments. A challenge for all is organizing a central collection point for exporters to procure the fruit. Brokers go from farm to farm, and play a role in picking and transporting the fruit that neither

the exporters nor farmers can easily substitute for.

Issues related to meeting certification standards are similar for mangos and avocados. However, it is important to note that Kenya mangos are not generally sold in EUREPGAP and other certified markets at present. The incentive to meet these standards would be better access to these export markets, but also improved quality and safety in the domestic and non-certified export markets. Disincentives to this form of upgrading are the expense and lack of equipment for testing, the difficulty of getting all producer group members to comply with standards (where small scale producers link to exporters through producer groups), and the expense that exporters must cover to follow up/audit smallholder compliance.

### **Upgrading Passion Fruit**

Passion fruit can be upgraded in several ways: by planting grafted passion fruit (with purple passion fruit grafted onto disease-resistant yellow passion fruit root stock); by improving production techniques, by selling to new market outlets, and by meeting certification standards.

There are many incentives for farmers to plant grafted seedlings. It is a way to reduce the chance of disease: grafted plants are hardier because the roots are disease resistant. Because they are disease resistant, they can be planted closer together and thus cultivated and harvested more easily. While some chemicals are still beneficial, farmers can avoid the use of heavy chemical sprays required to resist the disease on normal purple passion fruit. These plants are safer and friendlier to the environment, live longer, and have higher yields.

To date, however, few farmers have planted grafted seedlings, in part because they are not widely available. The cost of producing these seedlings is still



high and channels to distribute them commercially have yet to be established. Moreover, most farmers do not know how to care for grafted plants, which require technical know how and proper planting and care to succeed. There has been limited experience with grafted seedlings to date in Kenya. Farmers interviewed also mentioned lack of sufficient capital to buy the seedlings, wire, and sprays and to hire labor. They also mentioned the importance of certification as an incentive – without this, it is impossible to determine the quality of the root stock ahead of time. Fintrac HDC is working with agricultural research and demonstration centers and private nurseries to promote the production of grafted seedlings. They are encouraging farmer training in passion cultivation, and demonstration plots with grafted seedlings.

Improved production techniques for passion fruit, in addition to grafting, include better planting techniques, chemical application, and grading and sorting. The incentive for farmers to improve production techniques include reduced disease and increased volume of production, especially of higher-grade fruits. Constraints to this form of upgrading relate to gender discrepancies in access to training; the qualitative research found that men received training in passion fruit cultivation, although women do most of the work. Women have little knowledge of what chemicals to use and how to apply them; they also expressed fears of the side-effects. Other constraints include lack of manure (blamed on problems in the dairy industry) and sufficient labor. The use of the wrong chemicals increases human health risks and the costs of production, and reduces the competitiveness of Kenyan passion fruit when they do not meet the standards in export markets regarding chemical residuals (MRLs). Other risks affecting farmers' decision to upgrade passion fruit production processes include seasonal fluctuations

in the markets, price fluctuations, and the opportunity costs of shifting from other crops (especially wheat). Seasonal gluts of passion fruit on the market are a disincentive to invest in improved production techniques that increase volumes.

### Market Outlets

Passion fruit farmers participating in the study currently sell to HCDA and Ugandan brokers. HCDA payments are guaranteed, the prices are fixed and favorable (although viewed as unfavorable relative to high-season prices paid by Ugandan traders). Farmers also can access training in production techniques from HCDA. The main constraint is that payments from HCDA are sometimes delayed. Moreover, larger farmers have an advantage over smaller growers because they have means of transporting their fruit to the collection points. Ugandan brokers pay good prices in cash, are regular customers, and have direct and regular contact with women farmers through mobile phones. They come directly to the women farmers to buy. The good relationship between the women farmers and Ugandan brokers is a striking contrast to the relationships between avocado and mango farmers and brokers. The main constraint for passion fruit farmers is the seasonal demand for passion fruit in the Uganda market, and lack of a market for their lower grade fruits because there is no passion fruit processing plant.<sup>24</sup> A preliminary feasibility assessment for a passion fruit processing plant by Fintrac HDC suggests that it may not be a viable investment. For the plant to compete on price with passion fruit pulp from South Africa (currently sold in Kenya and in outside markets), the prices that would have to be paid to Kenyan farmers would be extremely low, probably too low to be an incentive

<sup>24</sup> Ugandan traders are viewed favorably because they take all the fruit.

for farmers to produce the volumes required to make it profitable.

The most promising potential for expanding market outlets for passion fruit appears to be export markets – which require farmers to meet certification standards. As with avocados and mangos, this involves using certified chemicals, following specific handling and storage practices, wearing protective clothing, testing soil and water, and documenting chemical use and product handling. The total upfront cost of certification is around \$1,000, with a lower level of recurrent costs. The incentive for farmers to do this is that they can continue to sell to HCDA and other buyers who supply exporters and thus build up relationships with exporters to markets other than Uganda and Rwanda. Input suppliers can benefit by selling more chemicals and providing spraying services. Exporters can respond to unmet demand in European markets for fresh passion fruit. The constraints are the expense, lack of knowledge, and difficulty of certifying individual smallholders (the plan described by respondents in interviews is for a small subset of group members to be randomly selected and audited, and if they pass, the whole group would be certified).

## 5. INTER-FIRM COOPERATION

### Horizontal Cooperation through Producer Groups

All of the sub-projects in the study promote the formation of producer groups as part of their strategy to link smallholders to input, service, and product markets. The EAGA and Just Juice sub-projects are designed to link avocado and passion fruit farmers directly to an exporter and spraying services. The SITE and KADI sub-projects link mango producer groups to training, inputs, and extension services. SITE also is trying to link the groups to mango exporters and inputs suppliers.

Fintrac HDC is working through farmer groups to promote grafted passion fruit through demonstration plots and links to training resources. At the time of the qualitative research, producer groups had been formed, but most (except the avocado groups) were still at an early stage in their actual activities. All of the groups have both women and men members, although men tend to dominate the meeting discussions and leadership.

Farmers commented on the reasons (incentives) that they joined, and what they see as the potential benefits of the groups. They see the groups as a way to access training, finance, information, and advice about growing tree fruits. They can provide a forum for learning good farming techniques, new production techniques, and to encourage more business oriented farming. They are seen as a focal point to exchange information on prices, buyers, and markets and obtain information on market demand (varieties and quality of fruit demanded). Farmers feel they can improve access to better markets for tree fruits and help farmers coordinate marketing activities so they have less chance of being cheated. They see the potential for using the groups to access market for other crops, in addition to tree fruits. They see that groups have potential for giving them 'one voice' and more negotiating power with buyers. They provide a link to the outside world and a way to reduce isolation and develop a sense of belonging. Some commented that they provide a renewed sense of importance for retired men.

Mango and passion fruit farmers further see the groups as a way of increasing their bargaining power with brokers – by sharing information and discussing prices ahead of time. Women group members near Eldoret have formed an informal group that sells to brokers from a central collection point.

Avocado groups have played a formal role in negotiating specific MOUs between the groups and EAGA about supplying avocados. The groups are responsible for keeping records of volumes supplied and distributing payments to members and, with Kenya BDS support, have done this well. The groups are formally registered and can play a formal role in negotiating legal agreements.

The exporters we interviewed saw producer groups as a way to reduce the transaction cost of dealing with small producers and comprise a more efficient supply chain than brokers. If successful relationships can be established, it is a way for them to access larger volumes of fruit. Over time, the exporters see smallholder producer groups as having potential for offering a more reliable supply of fruit and better quality fruit. This will help exporters plan ahead for their uplift, which makes them more competitive. Group records can help exporters comply with traceability requirements. It should be noted, however, that the exporters interviewed said that there was not full consensus in their firms about sourcing directly from producer groups. The verdict, as reflected in the bottom line, is still not in.

For input suppliers, farmer groups are seen as an efficient vehicle for providing information on product choices and product use, and for promoting their products.

Respondents also commented on the potential constraints, or *downside*, of group membership. When farmers sell exclusively through producer groups, they lose autonomy to negotiate as individuals. They become dependent on the group for their market link, as their relationship with brokers or other buyers is cut off. Some farmers have a competitive advantage, and they lose this as a member of the group. Leaders do not get paid, and often lose motivation or

become domineering. People can spend inordinate amounts of unproductive time attending group meetings – and if the group does not deliver to members, it is often people who have time on their hands who end up participating. Another issue is that there may be social pressure to stay in the group even if someone doesn't want to. A group issue raised by passion farmers is that the upgrading approach promoted by the group in some cases may be more appropriate for larger farmers (e.g., certification requirements). Small farmers may be adopting a model that is not cost effective for them. One mango farmer commented that brokers now steer away from their area when buying mangos because the group members agreed to a minimum price. When the brokers found it difficult to negotiate for lower prices, they abandoned the area, leaving the farmers with over-ripe fruit and no market at all. Another mango farmer commented on how difficult it was to get group members to stick to prices they agree upon with other members. If they need money quickly or their fruit is over-ripe, they are forced to accept whatever brokers offer.

**Table 5: Survey Respondents by Location**

Location	Participant	Control	Total
EAGA avocado (Central Province)	250	250	500
SITE mango (Eastern and Central provinces)	350	349	699
KADI mango (Eastern Province)	70	-0-	70
Fintrac passion fruit (Rift Valley Province)	206	173	379
Just Juice passion fruit (Eastern Province)	148	151	299
All sites	1,024	923	1,947

### Role of the Projects in Organizing Producer Groups

Field observations during the qualitative research found the avocado groups to be highly organized and focused in their activities. The groups are strict and disciplined. Leaders mentioned that some members dropped out because of the stringent requirements for attendance and participation. Only one member of each family can be a member, and this is usually in the name of the man, even if the woman is the main farmer and participant. The mango groups are much larger (over 100 members in some, compared to 25-30 in the avocado and passion fruit groups), but many members were inactive. They appeared to be less tightly organized and had been less successful in linking directly to exporters or extension services. They tend to be dominated by larger farmers, mostly men. The passion fruit groups were well organized, although much of the activity related to passion fruit – marketing and "merry-go-round" savings schemes -- gets done outside the group structure through other informal grouping of women. The groups play a limited role at present, mostly related to training. Non-group members also participate in the training, benefit from the demonstration plots, and attend sales date meetings.

### Horizontal Cooperation through Associations of Exporters

Despite discussions among some export companies about pursuing common interests through an association, there is currently no functioning association and the exporters do not coordinate formally with one another.

### Vertical Cooperation through Embedded Services

Vertical cooperation is promoted by the Kenya BDS project in its efforts to facilitate direct links between producer groups and exporters, and the provision of spraying services by exporters. The most visible progress at the time of the qualitative research, as described in earlier sections, has been with avocado producers. One challenge of this approach to promoting vertical cooperation has been negotiating a Memorandum of Understanding that all parties agree to. Wrinkles in the initial agreement and changes made in the agreement during the first year rankled some of the smallholders. Another challenge in the first year was the EAGA did not spray on time, which reduced the crop yields and quality. Smallholders were reluctant to agree to pay for spraying as part of their agreement in the second year, given the bad experience in the first year. They also experienced prob-

lems in delayed pick ups (with associated costs of hauling their fruit back and forth to the EAGA collection point).

## B. SMALLHOLDER PRODUCERS OF AVOCADOS, MANGOES, AND PASSION FRUIT

The baseline survey covered 1,947 smallholders located at five different sites (Table 5).

The majority of survey respondents (79 percent) were household heads and nearly all (94 percent) managed the farm in question. Ninety percent of the sampled households (1,748) were headed by men; ten percent (199) were headed by women. These percentages differed little among sites or between the participant and control groups. Additional characteristics of the households covered by the survey are discussed in Section 3, below.

## 1. ENTERPRISE-LEVEL FINDINGS

The baseline survey collected data on a wide range of topics. Several important features of the MSEs surveyed are analyzed in this section: scale of enterprise; production; productivity; participation in trade; use of hired labor; innovations and investments; participation in a producer group; and sources of useful technical advice, information, or training related to tree crops. The analysis determines baseline values for these variables and makes comparisons between participant and control groups. At the end of this section, we discuss the relationship between these enterprise variables and both socio-economic status (measured by asset score) and the gender of the farmer.

### a. Scale of enterprise

The average number of trees of the targeted fruit (that is, avocado trees in the

**Table 6. Number of Trees/Vines per SME by Intervention: Average and Distribution**

	EAGA			SITE			KADI			Fintrac HDC			Just Juice		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
BASE: Total Sample	250	250	500	350	349	699	70	0	70	206	173	379	148	151	299
1-9	55	148	203	2	2	4	0	0	0	0	0	0	0	0	0
10-19	82	75	157	50	51	101	3	0	3	0	0	0	1	9	10
20-29	45	16	61	29	52	81	4	0	4	0	1	1	0	10	10
30-49	48	7	55	55	77	132	14	0	14	2	5	7	1	11	12
50-99	13	2	15	83	91	174	17	0	17	6	31	37	14	34	48
100+	7	2	9	126	76	202	32	0	32	198	135	333	131	87	218
Mean	25	12	18	120	82	101	109	0	109	961	453	730	376	192	282
Standard Deviation	34	16	27	159	159	160	125	0	125	1,252	811	1,102	872	244	643

avocado sites, mango trees in the mango sites, and passion fruit vines<sup>25</sup> in the passion fruit sites) varied among the three tree fruits, and also between program participants and control group members (Table 6). There was wide dispersion around all the averages. The survey thus covers a considerable range of farm scales, from very small to rather large.

Mango farms tend to have far more trees (160 on average) than avocado farms (27 trees), while the average number of passion fruit vines is higher still. The sampled farms that are participating in the Fintrac project have far more vines (1,252 on average) than the ones at Kenya BDS's Just Juice intervention site (872). At both passion fruit sites, there were large numbers of immature vines.

## b. Production and productivity

Fruit production (measured in pieces of fruit harvested in the past year for avocado and mango and in kilograms for

passion fruit) also varied widely from farm to farm. In the EAGA avocado area (see Table 7), smallholders averaged around 10,000 pieces per year, with program participants producing more than twice as much on average as control group farmers. Participants at the SITE mango area averaged about 35,000 pieces per year, again more than twice the production of control group members. At the KADI mango site, average production among participants was much lower (11,000 pieces) than in the SITE area. Passion fruit production (see Table 8) was very high among Fintrac HDC project participants and controls, averaging 353,000 kilograms. In the area covered by the Kenya BDS/Just Juice intervention, average production was far smaller, 67,000 kg. per year. It is clear that the Fintrac HDC project deals with an entirely different size class of farms from the Kenya BDS interventions.

The distribution of avocado farms by annual production level was relatively even. Modal production was in the range of 10,000-15,000 pieces; eight percent of the farms sampled produced

fewer than 1,000 pieces while nine percent produced more than 30,000.

The distribution of production among farms in the SITE mango intervention area was more slanted toward the larger farms. Seven percent of farms produced less than 1,000 pieces (including seven that had no production) while fifteen percent harvested more than 30,000 mangos in the previous year. KADI mango participants clustered in the 3,000-10,000 production range.

In the Fintrac HDC passion fruit area, the distribution of production was highly unequal, with 77 farms not yet in production and 133 farms producing more than 100,000 kilograms of fruit per annum. Average production on participating smallholdings was more than twice as great as on control farms. The Just Juice area also had a significant number of non-producing farms but also had fewer large producers, hence much less dispersion around the mean production level.

The productivity of the avocado and mango smallholdings in the survey (Table 9) is defined as annual production per producing tree or vine. In the EAGA avocado area, modal productivity is in the 401-800 range for both participants and controls. However, participants have slightly higher productivity on average (600 pieces per tree) than controls (500).

The SITE mango area is more productive on average than the KADI area. Participants in the SITE area average 300 mangos per tree, versus 150 for both control group farmers and partici-

<sup>25</sup> Passion fruit actually grows on vines rather than trees.



pants in the KADI area. The higher average for SITE area participants is accounted for by the presence of a significant number of farmers who are getting considerably higher yields, running from 300 to more than 1,000 mangos per tree. Possible explanations for these superior yields include better tree stocks, better cultivation techniques, and greater maturity of the trees.

Fintrac HDC passion fruit participants (see Table 10) attain productivity levels (500 kg. of fruit per vine on average) that are two and a half times as high as Just Juice participants (200 kg.). Fintrac HDC controls also have relatively high productivity, while Just Juice controls have the same average productivity as Just Juice participants.

### c. Participation in trade

Many Kenyan farmers grow tree fruit for use at home and limited sales to the local market, but few participate in supplying the export trade. In our sample, 97-98 percent of avocado and mango growers earned some income from tree fruit sales, but nearly all of them earned only very small amounts (see Table 11). In the EAGA intervention area, 84 percent of farmers earned less than Ksh 10,000 (US\$127) per year from avocado sales and the average for all growers was only Ksh 8,000 (US\$101). Just two farmers, both program participants, earned more than Ksh 100,000 (US\$1,266) from avocado sales in the year preceding the survey.

SITE mango farmers had a similar pattern of crop marketing, although they earned slightly more on average (Ksh 11,000 or US\$ 139) and had more farmers who earned Ksh 10,000-40,000. One SITE participant and one control group member earned more than Ksh 100,000 from mango sales. In the KADI area, earnings were much lower: average mango sales were only Ksh 6,000 (US\$76) and no farmer earned more than Ksh 20,000 from this source.

Significant numbers of passion fruit growers did not sell any fruit because their vines were still immature. Fintrac HDC project participants averaged Ksh

11,000 in sales; 15 project participants earned in the Ksh 20,000-90,000 range and three made more than Ksh 100,000 selling passion fruit. Control group members in the Fintrac HDC project areas did considerably less well, averaging Ksh 5,000 in passion fruit sales. Passion fruit growers in the Just Juice intervention area also averaged just Ksh 5,000 in sales, with little difference between participants and controls. No one in this area earned over Ksh 20,000 from passion fruit sales.

**Table 7. Pieces of Avocado and Mango Harvested in Past Year: Average and Distribution**

	EAGA Avocados (pieces)			SITE Mangos (pieces)			KADI Mangos (pieces)		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
0	0	0	0	7	0	7			
1-1,000	21	35	56	18	25	43	3	0	3
1,001-2,000	13	43	56	24	56	80	2	0	2
2,001-3,000	20	50	70	31	49	80	8	0	8
3,001-5,000	35	54	89	38	43	81	13	0	13
5,001-7,000	27	14	41	32	34	66	15	0	15
7,001-10,000	28	27	55	39	40	79	10	0	10
10,001-15,000	38	10	48	30	36	66	8	0	8
15,001-20,000	23	8	31	27	21	48	3	0	3
20,001-30,000	23	4	27	24	20	44	4	0	4
30,001 – 50,000	14	3	17	25	14	39	2	0	2
50,001 – 70,000	4	0	4	19	4	23	1	0	1
70,001 – 100,000	2	1	3	13	3	16	0	0	0
100,001+	2	1	3	23	4	27	1	0	1
Total	250	250	500	350	349	699	70	0	70
Average in 000's	13	6	10	35	14	24	11	0	11
Standard Deviation	17	13	15	147	56	111	16	0	16

NOTE: Average production is the average per producing farm.



**Table 8. Kilograms of Passion Fruit Harvested in Past Year: Average and Distribution**

	Fintrac Passion (Kgs)			Just Juice Passion (Kgs)		
	Participant	Control	Total	Participant	Control	Total
0	27	50	77	37	15	52
1-1,000	0	0	0	11	21	32
1,001-2,000	0	0	0	5	8	13
2,001-3,000	1	0	1	7	4	11
3,001-5,000	4	1	5	13	14	27
5,001-7,000	2	2	4	9	9	18
7,001-10,000	5	7	12	8	14	22
10,001-15,000	6	6	12	7	14	21
15,001-20,000	5	4	9	7	11	18
20,001-30,000	12	10	22	6	15	21
30,001 – 50,000	11	23	34	15	10	25
50,001 – 70,000	14	13	27	3	5	8
70,001 – 100,000	29	14	43	6	7	13
100,001+	90	43	133	14	4	18
<b>Total</b>	<b>206</b>	<b>173</b>	<b>379</b>	<b>148</b>	<b>151</b>	<b>299</b>
Average in 000's	462	195	353	43	27	35
Standard Deviation	1,694	751	1,394	72	61	67

Farmers were also asked to whom they sold the fruit that they marketed.<sup>26</sup> Table 12 shows the marketing channels used by each of the groups surveyed. It indicates that the farmers surveyed use a range of marketing channels, no one of which accounts for more than 30 percent of total sales for any of the groups identified in the table. Farmers commonly sell their fruit either to local traders, who supply nearby markets, or to brokers, who then resell it in national, regional, or export markets. Direct sales to consumers are also important for mango and passion fruit growers, but not for avocado producers. Direct sales to supermarkets and processing plants

are relatively uncommon. Marketing patterns for program participants and control group members at any particular program site are generally similar. However, there is a notable difference between passion fruit growers in the Fintrac HDC areas, who sell substantial amounts to the regional East African market, and growers in the Just Juice area, who have not tapped the regional market and rely heavily on sales to local traders and consumers.

Farmers sell their fruit either on a spot basis for the prevailing market price or under long-term contracts at fixed prices. Table 13 shows that contract sales predominated among participating avocado growers in the EAGA project area as well as among both participants and controls in the Fintrac HDC passion fruit areas. They were less important for participants in the two mango projects and relatively insignificant for Just Juice participants and for all control groups except those in the Fintrac HDC

areas. Broadly, contracts are associated with brokered sales to national, regional, and export markets, while spot sales characterize sales to local markets.

Mutual trust is needed for a contract system to work effectively. Contractual arrangements can give rise to “post-contract opportunism” when the spot market price changes and either the buyer or the seller reneges on contractual obligations in search of a better deal. Farmers who sold fruit under contract during the past year were asked to rate their contractors on a four-point scale ranging from “very reliable” to “very unreliable.” Half or more of respondents rated their contractors as “very” or “fairly” reliable, while hardly any found their contractors to be “very unreliable.” Among avocado producers, satisfaction with contractors was in the 80-90 percent

range. Fintrac HDC passion fruit growers who sold on contract were somewhat less satisfied; 64 percent of them rated their contractors as “very” or “fairly” reliable.

#### **d. Use of hired labor**

Enterprise development programs often rank employment creation as one of their principal objectives, but micro and small enterprises frequently rely heavily on family labor and hire few workers from outside the family circle. This pattern holds for most but not all of the Kenyan fruit growers in our survey sample, as Table 14 shows.

Surveyed smallholders vary widely in their use of hired labor. Overall, more than one-third (37 percent) reported using no hired labor at all in the previous year. The percentage of farmers who used no hired labor was uniformly high (45 percent or more) in all the control groups surveyed. At the other end of

<sup>26</sup> Respondents were asked to name which of a wide range of possible customers they sold fruit to. In addition to those listed in Table 13, other types of customer, which did not account for as much as five percent of sales for any class of producer, were the HCDA, fruit processing factories, Top Notch, schools, and hospitals.

**Table 9. Pieces of Avocado and Mango Harvested in Past Year per Producing Tree**

	EAGA Avocado (pieces)			SITE Mango (pieces)			KADI Mango (pieces)		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
1-100	14	28	42	53	51	104	18	0	18
101-200	22	21	43	108	166	274	44	0	44
201-300	25	28	53	82	90	172	5	0	5
301-400	29	28	57	38	32	70	1	0	1
401-800	108	117	225	40	10	50	2	0	2
801-1000	33	23	56	17	0	17	0	0	0
Total	250	250	500	350	349	699	70	0	70
Average	600	500	500	300	200	300	100	0	100

the scale, 99 percent of participating KADI mango growers and 96 percent of EAGA avocado participants used at least some hired labor. Fintrac-area passion fruit growers made especially heavy use of hired labor.

#### e. Innovations and investments

Respondents were asked two questions about recent innovations and investments. The first question was whether they had made any changes in their cultivation or marketing methods for the targeted tree fruit in the past two years. As Table 15 shows, program participants reported high rates of innovation in all cases except the Just Fruit passion

fruit intervention. These rates of change in cultivation methods were much higher than those reported by the control group, although in the Fintrac HDC passion fruit areas controls also had a relatively high rate of innovation.

Table 15 also shows the percentage of respondents who said they had planted fruit trees in the past year. High percentages of participants reported planting trees in the SITE mango area and all passion fruit areas. Large numbers of control group smallholders for the SITE mango and Fintrac HDC passion fruit areas also reported replanting.

**Table 10. Kilograms of Passion Fruit Harvested in Past Year per Producing Vine**

	Fintrac Passion (Kgs)			Just Juice Passion (Kgs)		
	Participant	Control	Total	Participant	Control	Total
0	27	50	77	37	20	57
1-100	23	6	29	68	66	134
101-200	41	36	77	11	33	44
201-300	32	41	73	15	11	26
301-400	28	28	56	6	10	16
401-800	44	10	54	9	11	20
801-1000	1	0	1	1	0	1
1000+	10	2	12	1	0	1
<b>Total</b>	<b>206</b>	<b>173</b>	<b>379</b>	<b>148</b>	<b>151</b>	<b>299</b>
Average	500	300	400	200	200	200

**Table 11. Earnings from Sales of Fruit in Past Year (Kenya shillings)**

	EAGA			SITE			KADI			Fintrac HDC			Just Juice		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
0	6	4	10	11	7	18	0	0	0	24	52	76	18	12	30
1-10,000	197	213	410	239	271	510	65	0	65	152	111	263	129	138	267
10,001-20,000	30	24	54	53	48	101	5	0	5	12	7	19	1	1	2
20,001-30,000	7	4	11	13	7	20	0	0	0	2	1	3	0	0	0
30,001-40,000	5	3	8	10	4	14	0	0	0	2	0	2	0	0	0
40,001-50,000	0	2	2	3	5	8	0	0	0	2	0	2	0	0	0
50,001-60,000	2	0	2	7	3	10	0	0	0	5	1	6	0	0	0
60,001-70,000	1	0	1	7	1	8	0	0	0	2	0	2	0	0	0
70,001-80,000	0	0	0	3	1	4	0	0	0	1	1	2	0	0	0
80,001-90,000	0	0	0	2	1	3	0	0	0	1	0	1	0	0	0
90,001-100,00	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
100,001-150,000	1	0	1	1	1	2	0	0	0	1	0	1	0	0	0
150,001+	1	0	1	0	0	0	0	0	0	2	0	2	0	0	0
Total	250	250	500	350	349	699	70	0	70	206	173	379	148	151	299
Average (000's)	9	6	8	12	9	11	6	0	6	11	5	8	4	5	5

NOTE: Average sales the average for all farms, regardless of whether they sold fruit.

**Table 12. Sales by Type of Customer and Interventions (percent of total sales)**

	EAGA Avocados			SITE Mango			KADI Mango			Fintrac HDC Passion			Just Juice Passion		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
HCDA	3	n	2	1	-	n	-	-	-	13	3	9	1	-	n
Exporters (direct)	4	1	2	3	-	1	-	-	-	3	-	2	5	3	4
<b>Subtotal direct sales to exporters</b>	<b>7</b>	<b>1</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>3</b>	<b>11</b>	<b>6</b>	<b>3</b>	<b>4</b>
Broker selling to exporter	7	20	13	12	1	7	1	-	1	12	6	9	18	21	20
Brokers selling to Uganda /Rwanda/Other regional market	1	n	1	1	n	n	-	-	-	28	23	27	1	1	1
Broker selling in Kenya	17	24	20	16	11	14	23	-	23	9	13	10	8	10	9
Broker (Do not know whom selling to)	18	20	19	14	12	13	6	-	6	12	19	15	9	14	11
Local traders selling in Kenya (from nearby towns)	18	26	22	22	22	22	21	-	21	10	13	11	22	31	26
<b>Sub total sales to brokers &amp; traders</b>	<b>61</b>	<b>90</b>	<b>75</b>	<b>65</b>	<b>46</b>	<b>56</b>	<b>50</b>	<b>0</b>	<b>50</b>	<b>71</b>	<b>74</b>	<b>71</b>	<b>58</b>	<b>77</b>	<b>67</b>
Consumers	5	5	5	17	29	23	21	-	21	10	17	12	21	19	20
Wholesale markets/ wholesaler	2	3	2	4	5	5	6	-	6	1	1	1	2	-	1
Shop / Supermarket	n	-	n	4	11	8	9	-	9	1	2	2	1	n	1
Masii mango	24	-	13	1	-	n	-	-	-	n	1	1	7	-	4
Fruit processor factory	1	1	1	-	-	-	3	-	3	n	-	n	1	1	1
Another farmer	n	-	n	3	7	5	10	-	10	1	2	1	3	-	2
Top notch	n	-	n	1	n	1	-	-	-	-	-	-	-	-	-
Schools	-	-	-	1	2	1	-	-	-	-	-	-	1	-	n
Hospitals	-	-	-	n	-	n	-	-	-	-	-	-	-	-	-
<b>Subtotal direct sales to other domestic buyers</b>	<b>32</b>	<b>9</b>	<b>21</b>	<b>31</b>	<b>54</b>	<b>43</b>	<b>49</b>	<b>0</b>	<b>49</b>	<b>13</b>	<b>23</b>	<b>17</b>	<b>36</b>	<b>20</b>	<b>29</b>
	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100

**Table 13: Percentage of Contract Sales**

	PARTICIPANT (%)	CONTROL (%)	TOTAL (%)
EAGA Avocado	80	12	46
SITE Mango	47	13	30
KADI Mango	23	-0-	23
Fintrac Passion	61	74	64
Just Juice Passion	6	19	38

## f. Use of inputs

The survey included questions about the use of water, fertilizer, and insecticide or fungicide sprays. Water is necessary for fruit tree cultivation, but very few of the smallholders surveyed had access to irrigation. Of the 1,947 farmers in the sample, only 40 reported using drip irrigation and 135 had sprinkler systems. The remainder relied on hand watering or rainfall.

A total of 798 farmers, 41 percent of the total sample, reported spending money to purchase fertilizer for use on their fruit trees. Expenditure by these farmers averaged Ksh 3,400 (US\$43). On average, program participants spent more than twice as much on fertilizer as control group members (see Table 16).

A larger number of respondents (1,388 or 71 percent of the total) said they had purchased sprays for use on the targeted fruit trees during the past year. The av-

erage expenditure reported was the same as for fertilizer, Ksh 3,400. Again, program participants spent more than twice as much as control group members (see Table 17).

## g. Participation in producer groups

Since all the programs in the study approach smallholders through tree fruit producer groups, it is not surprising that nearly all program participants are members of such groups. In sharp con-

trast, hardly any control group members belong to producer groups. This dichotomy is shown in Table 18.

The tree fruit producer groups to which participants belong appear to be active organizations. More than 60 percent of members report having attended five or more producer group meetings in the past six months. When producer group members were asked to rate the usefulness of these organizations on a three-point scale, 66 percent said they were "very useful," 32 percent characterized them as "fairly useful," and only two percent found them to be "not at all useful."

**Table 14: Distribution of Respondents by Amount of Hired Labor Used**

	EAGA			SITE			KADI			Fintrac HDC			Just Juice		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
None	11	172	183	109	158	267	1	0	1	50	78	128	63	70	133
1-5	30	34	64	56	104	160	2	0	2	11	5	16	15	15	30
6-10	39	16	55	48	29	77	5	0	5	8	14	22	5	11	16
11-15	30	6	36	42	17	59	4	0	4	4	2	6	5	15	20
16-20	43	3	46	29	13	42	5	0	5	5	3	8	9	7	16
21-25	23	3	26	19	12	31	11	0	11	1	2	3	6	3	9
26-40	33	7	40	15	13	28	18	0	18	9	5	14	5	14	19
41+	41	9	50	32	3	35	24	0	24	118	64	182	40	16	56
Total	250	250	500	350	349	699	70	0	70	206	173	379	148	151	299
Average days used	34	6	20	16	5	10	68	0	68	198	375	278	53	17	35

**Table 15: Changes in Cultivation Methods and Planting of Fruit Trees (% answering yes)**

Change in cultivation methods in past two years -- % answering yes			
	Participant	Control	Total
EAGA	88	4	46
SITE	72	38	55
KADI	50	-0-	50
Fintrac HDC	73	51	63
Just Juice	36	20	28
Fruit tree planting in past year -- % answering yes			
	Participant	Control	Total
EAGA	12	15	14
SITE	53	61	57
KADI	31	-0-	31
Fintrac HDC	68	64	66
Just Juice	68	32	49



**Table 16: Average Expenditure on Fertilizer Used on Targeted Fruit Trees in Past Year (Ksh)**

	PARTICIPANT	CONTROL	TOTAL
EAGA	2,600	900	2,100
SITE	1,900	1,100	1,700
KADI	11,800	-0-	11,800
Fintrac HDC	7,000	3,700	5,600
Just Juice	3,800	1,500	2,700
Total Sample	4,300	2,000	3,400

#### **h. Sources of Useful Technical Advice, Information, or Training Related to Tree Fruit Production**

Finally, respondents were asked to say where they obtained advice, information, or training that assisted them in tree fruit cultivation. Their spontaneous responses were coded on a grid by the enumerator. The sources mentioned most often, in order of frequency, were: non-official extension agents; Ministry of Agriculture/KARI extension agents; neighbors, family, and friends; producer groups of which the respondent is a member; the USAID project in question; seminars and meetings; local leaders; buyers of the fruit; and nurseries.

#### **i. Differences by Gender of Farmer**

Women manage 24 percent of the smallholdings in our sample (469 out of 1,947). Their holdings tend to be smaller than those managed by men, with 142 fruit trees on average, versus 258 for men. Woman-managed farms also have lower average levels of production, productivity, and sales. However, they hire more labor than farms managed by men: 134 person/days per year on average compared to 97. There was little difference between men and women in sales by type of customer.

Female proprietors participated in producer groups as actively as male proprietors. Forty-nine percent of women respondents reported attending at least one producer group in the past six

months, compared to 45 percent of men. Sixty-four percent of women who attended producer group meetings said they went to five or more such meetings, while 59 percent of male producer group members reported attending five or more meetings in the past six months.

#### **j. Differences by Socio-economic Status**

As discussed elsewhere in this report, the entire sample was divided into eight socio-economic groups based on household asset scores. Unsurprisingly, these differences in household wealth correlated with several differences among tree fruit enterprises (Table 19). Some of these differences were very large. For example, the average number of trees owned by farmers in the highest asset score group was more than 20 times as the average for the lowest asset score group while the disparity in production was more than 40:1. The disparity in sales was much smaller, about three-to-one. The relationship between household wealth and the amount

of labor hired to cultivate tree fruit was more complex. The richest group of farmers (Group 8) hired the largest amount of labor, but the next two groups down (Groups 6 and 7) hired relatively little. The distribution then hit a second peak at Group 4 before declining sharply to a very low level of labor use by Group 1.

The data on sales by type of customer show that farmers in the lowest asset score category sell more to brokers than those in the highest asset score category (78 percent of sales compared to 62 percent of sales). The lowest asset score group sells also less to HCDA and exporters (direct) than the highest asset score group (two percent compared to eight percent).

Fruit sales are higher for the participant group compared to controls across wealth categories. In looking at the use of hired labor, poorer participant groups use more hired labor than poorer controls, while wealthier participant groups use less hired labor than wealthier controls.

**Table 17: Average Expenditure on Sprays Used on Targeted Fruit Trees in Past Year (Ksh)**

	PARTICIPANT	CONTROL	TOTAL
EAGA	1,400	800	1,300
SITE	4,100	1,000	3,000
KADI	2,100	-0-	2,100
Fintrac HDC	5,100	3,600	4,400
Just Juice	5,800	2,900	4,300
Total Sample	4,200	2,000	3,400

**Table 18: Percentage of Respondents who are Members of a Producer Group**

	PARTICIPANT	CONTROL	TOTAL
EAGA	99	0	50
SITE	100	0	50
KADI	93		93
Fintrac	98	2	54
Just Juice	92	4	47
Total Sample	98	1	52

sold their fruit predominantly in spot markets.

Hired labor was used fairly extensively by richer farmers, while poorer farmers re-

lied primarily on family labor. Woman-managed farms tended to hire more labor than comparable farms managed by men.

Producer group membership was almost ubiquitous among program participants, both male and female. Moreover, nearly all of the farmers who belonged to producer groups characterized them as either very or fairly useful.

Few farmers had access to irrigation and less than one-half purchased fertilizer for use on their fruit trees. A larger number said they had bought pesticide or fungicide sprays.

Considerable numbers of respondents had instituted improved cultivation or marketing methods in the previous two years. Large numbers in some areas had planted fruit trees in the past year. Farmers looked to a wide range of sources for useful technical advice, information, or training.

## 2. HOUSEHOLD-LEVEL FINDINGS

Our second hypothesis is that greater integration of smallholder MSEs into the tree fruit value chain will contribute to improved enterprise performance and household well-being. Household well-being is considered here in terms of diversification of household income sources, increase in household consumption expenditures, and increased household assets. A profile of households and their baseline status on these household level variables is presented below.

### k. Summary of Enterprise-level Findings

We surveyed five interventions intended to promote upgrading and raise productivity and income from tree fruit among smallholder producers of avocado, mango, and passion fruit. The 1,947 MSEs included in the survey cultivated varying numbers of trees/vines, with avocado holdings the smallest and passion fruit the largest. For each fruit, the range of holding sizes was wide. In each case, production and productivity were higher for program participants than for controls.<sup>27</sup> It is unclear whether the difference reflects selection bias or early impacts of program participation. Between the two passion fruit sites, Fintrac HDC definitely works with larger, more productive farmers than Just Juice.

Nearly all the farms in the survey sell tree fruit, primarily through traders of different sorts, but most earned only small amounts from these sales. Contract sales have become dominant and relatively well accepted for EAGA avocado participants as well as both participants and controls in the Fintrac HDC passion fruit areas; remaining groups

**Table 19: Selected Enterprise Data by Asset Score Group (Entire Sample)**

Asset score group	Number of trees	Annual production (000)	Annual Sales (Ksh 000)	Person/days of hired labor in past year	Avg # producer group meeting attended in past 6 months
8 (highest)	677	244	14,800	551	2.4
7	385	189	8,700	136	2.3
6	290	69	8,000	80	2.0
5	176	40	6,200	230	2.2
4	133	37	5,400	400	2.1
3	91	30	6,400	160	2.5
2	69	17	4,200	180	2.1
1 (lowest)	30	6	4,900	80	1.6
Overall mean	230	76	7,200	106	2.2

<sup>27</sup> With the exception of Just Juice passion fruit, where participants and controls had similar productivity levels.

**Table 20: Average Number of Household Members, Earning Members, and Earner/Dependent Ratios by Intervention**

	Total Members			Earning members			Earner/Dependent Ratios		
	Participant	Control	Total	Participants	Control	Total	Participant	Control	Total
EAGA	5.6	5.6	5.7	1.9	1.9	1.9	.34	.34	.33
SITE	6.2	7.1	6.6	2.2	2.5	2.2	.35	.35	.35
KADI	5.9	-0-	5.9	2.6	-0-	2.6	.44		.44
Fintrac HDC	6.9	6.4	6.6	1.9	1.7	1.8	.28	.27	.27
JUST JUICE	5.1	4.3	4.7	1.8	1.7	1.7	.35	.40	.36
TOTAL	6.0	6.1	6.1	2.0	2.1	2.0	.33	.34	.33

#### a. Household Size and Economic Activity

In the overall sample, household size averages 6.1 members, including two earning members. Household size is lowest for the Just Juice sample at 4.7 and highest for SITE and Fintrac HDC at 6.6 members (Table 20).<sup>28</sup> Overall, there is little difference between the par-

of 5.3 members (EAGA and Just Juice have 5.1 and 5.6 respectively); in Eastern Province the figure is 6.0 members (SITE and KADI have 6.2 and 5.9 respectively); and in Rift Valley, poor households have an average of 5.5 members (the Fintrac households are even larger at 6.9 members).<sup>29</sup>

and vulnerability in Kenya, the similar ratios across wealth levels (indicated by asset scores) in the sample suggests other factors may be more important.

Among households in the sample, 78 percent have one or more children in school (Table 21). This ranges from a low of 63 percent in the EAGA sample

**Table 21: Respondent Households by Children in School and Intervention**

	% HH WITH CHILDREN IN SCHOOL			AVERAGE NUMBER CHILDREN IN SCHOOL		
	Participant (%)	Control (%)	Total (%)	Participant	Control	Total
EAGA	56	71	63	1.58	1.79	1.69
SITE	83	92	87	2.31	2.65	2.48
KADI	90		90	2.77	-0-	2.77
Fintrac HDC	89	89	89	3.10	3.07	3.08
JUST UICE	70	53	61	1.37	1.28	1.43
TOTAL	76	78	78	2.27	2.26	2.24

ticipant and control groups. Comparing to figures from the 1997 Kenya Welfare Monitoring Survey, the sample households appear to be slightly larger than for the general rural population – which is 5.0 members, but similar to the size of poor households. In Central Province, poor households have an average

The number of earning members averages around two across categories in the sample. The average earner dependent ratio in the overall sample is .33 (one earner for every three household members). This ratio is similar for the test and control samples and across interventions, fruit, gender of household head, and household asset score. While earner-dependent ratios have been shown to be a determinant of poverty

to a high of 90 percent in the KADI sample. Differences between participants and controls emerge for EAGA and Just Juice -- EAGA participant households have fewer school children and Just Juice participant households have more schoolchildren compared to controls. The average number of children in school is 2.27 overall and lowest for Just Juice (1.43) and highest for Fintrac HDC (3.08). These averages are similar for both participants and controls.

<sup>28</sup> A small number of households in the sample (18) refused to provide information on the number of household members – according to the survey team, this is not unusual in some parts of Kenya particularly where there are young children.

<sup>29</sup> According to the USAID strategy paper, the average number of household members for a farm household is 6.8 members.

**Table 22: Respondent Households by Members with Salaried Employment and Intervention**

	% HH with salaried workers			Average number salaried workers		
	Participant (%)	Control (%)	Total (%)	Participant	Control	Total
	%	%	%			
EAGA	40	27	33	.51	.36	.44
SITE	49	67	58	.66	.99	.82
KADI	50		50	.70	-0-	-0-
Fintrac HDC	42	42	42	.52	.47	.50
JUST JUICE	33	22	27	.49	.37	.43
TOTAL	43	44	44	.57	.62	.60

**Table 23: Percent Distribution of households by number of income sources**

	PARTICIPANT	CONTROL	TOTAL
BASE: Total Sample	1024	923	1947
Total number income sources			
1 (Lowest)	.01	.01	.01
2	.17	.12	.14
3	.34	.32	.33
4	.25	.36	.30
5	.15	.15	.15
6	.05	.04	.05
7	.02	.00	.01
8 (Highest)	.00	.00	.00
Average # income sources	3.6	3.6	3.6

Salaried income represents a regular and steady source of household income that can help rural households smooth seasonal farm incomes. It is associated with reduced vulnerability of rural households. Overall, 43 percent of respondent households had at least one member with salaried income.<sup>30</sup> Across interventions, this ranged from 27 percent for Just Juice, 33 percent for EAGA, 42 percent for Fintrac HDC, 50 percent for KADI, and 58 percent for SITE. The most notable differences between participants and controls were for EAGA and Just Juice – in both cases, participants had more households with salaried income than controls. (Table 22)

#### b. Sources of Household Income

The survey generated data from respondents on their sources of household income, the most important sources of household income, and the relative position of tree fruit income in the households.

The findings show that households in the sample are quite diversified in their sources of income. On average, they have 3.6 sources. Very few households have only one source of income (one percent) and 21 percent of households have five or more sources of income. Mango farmers have a slightly higher average number of income sources, but otherwise there are few differences across interventions, fruits, or between participants and controls (Tables 23 and 24).

**Table 24: Average Number of Household Income Sources by Intervention**

	PARTICIPANT	CONTROL	TOTAL
EAGA	3.7	3.6	3.6
SITE	3.6	4.0	3.8
KADI	3.8	-0-	3.8
Fintrac HDC	3.5	3.4	3.4
JUST JUICE	3.8	3.2	3.5
<b>TOTAL</b>	<b>3.6</b>	<b>3.6</b>	<b>3.6</b>

<sup>30</sup> *A priori*, this percentage seems surprisingly high. Research International believes that the high frequency of salaried workers may be attributable to the framing of the question, which categorized weekly and monthly wages as salaries.

**Table 25: Sources of household income (Total sample)**

Source of income	% households with income from source (%)
Tree fruit production and sale	96
Livestock production and sale	56
Cereals and tubers production and sale	42
Other fruits production and sale	40
Salaried labor	30
Vegetables production and sale	29
Business activities	27
Farm labor	12
Non-farm labor	5
Remittance	5
Investment/interest	5

The most frequently reported sources of income include production and sale of tree fruits (96 percent)<sup>31</sup>; production and sale of livestock (56 percent); production and sale of cereals and tubers (42 percent); production and sale of other fruits (40 percent); and production and sale of vegetables (29 percent). Within the sample, 27 percent of households had income from business activities, 12 percent from farm labor, and five percent from non-farm labor. Only five percent of respondents had income from remittances (Table 25).

While earnings from tree fruit sales are not high in absolute terms (see Enterprise section B.1.c), this income plays an important role as a source of household income. Almost half of all households ranked tree fruit as the number one source of income (Table 26). Tree fruit income is more important for participants (61 percent

ranked it number one) than for controls (32 percent ranked it number one). Tree fruit income is especially important for Fintrac HDC participants, three-fourths of whom ranked passion fruit income as their number one source. The importance of tree fruits as a source of income for farmers is further supported by the number of respondent households ranking it number two in importance – 22 percent of participants, and 30 percent of controls (Table 26). Overall, 35 percent of households estimated that tree fruits comprised more than half their household incomes – 48 percent of participant households and 21 percent of control households (Table 27). Income from passion fruit was particularly important for Fintrac HDC participants (Table 28).

### c. Household Consumption Expenditure

Consumption expenditure as defined in the study includes the estimated value of food grown at home, education ex-

penditures, and all other cash expenditures over the past month. From these questions, total monthly consumption expenditures and per capita monthly consumption expenditures were calculated for each respondent household. Household consumption expenditure generally is preferred over income as a measure of household poverty.

Monthly per capita expenditure averages Ksh. 5,800 for the overall sample (Table 29). Consumption is higher for participants (Ksh 6,500) than controls (Ksh. 5,200). The table further shows much lower expenditures in the EAGA sample, especially among controls (Ksh. 2,900), and much higher expenditure among KADI participants (Ksh. 16,000).

Half of the sample households have average monthly per capita expenditures less than Ksh. 3,000 (US\$40) and 40 percent have average monthly per capita expenditure less than Ksh. 2,000 (US\$27) (Table 30). This suggests that a significant number of households are under the \$1/day poverty line (39 percent of participants and 41 percent of controls). By comparison, 26.5 percent

**Table 26: Percent of Households Ranking Tree Fruit Income #1 or #2**

	PARTICIPANT (%)	CONTROL (%)	TOTAL (%)
% Household ranking tree fruit income #1			
EAGA	58	37	48
SITE	62	27	44
KADI	50	N/a	N/a
Fintrac HDC	77	46	63
JUST JUICE	45	21	33
TOTAL	61	32	47
% Households ranking tree fruit income #2			
EAGA	25	29	27
SITE	20	28	24
KADI	24	-0-	24
Fintrac HDC	15	28	21
JUST JUICE	30	36	33
TOTAL	22	30	26

<sup>31</sup> The survey supervisor believes that this number may be overstated because the subject of the survey was tree fruit production.



of the Kenyan population was under the \$1/day poverty line in 1999 (UNDP, 2001). At the same time, many of the respondent households have relatively high levels of consumption (15 percent have average monthly per capita expenditures over Ksh.10,000. (US\$138)).

#### d. Household Assets

Assets can be a proxy measure for household wealth or economic status. Respondents in the study were asked a set of yes/no questions on a long list of household assets, including productive assets. Based on these scores, the households were classified into eight wealth categories providing a socioeconomic profile of participants and non-participants.<sup>32</sup>

The findings show that there are more controls than participants in the lowest asset categories (1 and 2) and more participants than controls in the highest two asset categories (Table 31). Comparing interventions, EAGA respondents generally have lower asset scores than other groups; Fintrac HDC and Just Juice respondents have higher asset scores (Table 32). The data shows a larger proportion of EAGA respondents in the lowest asset category and a smaller proportion of respondents in the highest asset category compared to other intervention groups. The data further shows a larger proportion of Fintrac HDC and Just Juice respondents in the highest asset category compared to other respondent groups; and fewer respondents in the lowest asset categories. KADI and SITE are in between.

Landholding is another important household asset. It is important to note, however, that the sample covers a number of ecological zones, affecting the type of land, its productivity, and aver-

**Table 27: Proportion of Household Income from Tree Fruit (Estimated)**

	PARTICIPANT (%)	CONTROL (%)	TOTAL (%)
1-24%	21	43	32
25-49%	30	36	33
50-74%	38	17	28
75-99%	9	3	6
100%	1	1	1
Total	100	100	100

age landholding size. For example, landholdings in the fertile and populous areas of Central province (EAGA, Just Juice) typically are smaller than landholdings in the more arid areas of Eastern or Rift Valley provinces (SITE, KADI, Fintrac). Given this variation, the figures presented are not a good comparable measure of wealth across interventions in the sample, but more useful in comparing respondents within intervention samples.

There are slightly more participants than controls in the lower size landholding groups (two acres and below) and more controls than participants in the higher size landholding groups (over six

acres) (Table 33). Comparing landholding across interventions, a higher proportion of respondents in the EAGA and Just Juice samples – which are located in Central province -- are in the smaller landholding size groups (Table 34). Given smaller average landholding size in these areas, this is not unexpected. A higher proportion of the SITE, KADI, and Fintrac HDC participants are in the larger landholding size groups. This also is likely to be related to their geographic location (Eastern and Rift Valley provinces).

**Table 28: Proportion of Household Income from Tree Fruit (Estimated) by Intervention**

	EAGA			SITE			KADI			Fintrac HDC			Just Juice		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
0-24%	20	31	26	19	50	35	30	0	30	14	17	25	36	57	46
25-49%	39	46	42	31	36	34	34	0	34	15	25	19	32	29	31
50-74%	37	20	29	43	13	28	33	0	33	42	26	35	23	13	18
75-99%	2	3	3	5	1	3	3	0	3	27	8	18	9	2	5
100%	1	0	1	1	0	n	0	0	0	2	3	3	0	0	0
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

<sup>32</sup> A description of the methodology used to develop the asset scores is included in Annex C.

### e. Differences by gender of household head

Years of research in Kenya have shown that women headed households are more vulnerable than those headed by men. They tend to have more limited access to productive resources (land, labor, credit, technology, extension services, and other productive resources), and less extensive social networks. Many Kenyan women who head households have both time and spatial constraints, which combine to limit their mobility and participation in market activities beyond a certain range of their homes. Women who head households in geographically isolated areas are particularly vulnerable. In

**Table 29: Average Monthly Consumption Expenditure per Capita by Intervention (Ksh)**

Intervention	PARTICIPANT (Ksh)	CONTROL (Ksh)	TOTAL (Ksh)
EAGA	4,900	2,900	3,900
SITE	5,200	4,800	5,000
KADI	16,000	-0-	16,000
FINTRAC	7,100	7,500	7,300
JUST JUICE	6,600	6,900	6,800
TOTAL SAMPLE	6,500	5,200	5,800

general, woman-headed households have fewer business resources to draw upon than men headed households, but are more dependent on these activities to meet their household needs (Ruth-Aspaas, 2003). In light of these constraints, increased participation in on-farm cash crop activities such as tree fruit production and sales has potential to reduce the vulnerability of households headed by women.

cent, in Central province 32.3 percent, and in Rift Valley province 22.5 percent.

This finding suggests that the tree fruit projects may have reached a lower proportion of women headed households than in the general population. One reason may be that project outreach strategies target women farmers, but not explicitly women household heads, who are harder to reach and recruit given their geographic and social isolation. Another reason may be that women who head households have less time available to participate in producer groups and fewer labor resources to upgrade tree fruit production. Given their vulnerability, they may have less capacity to absorb the risks associated with participating in the projects.

The baseline research reveals some differences between men- and women-headed households (Table 36). On average, women-headed households have fewer members, but earner-dependent ratios are about the same as for men-headed households. A smaller proportion of women-headed households have salaried members and children in school than men-headed households. In terms of productive resources, the average landholding size for women-headed households is almost half that of men, 6.3 compared to 11.5 acres. Average consumption expenditure per capita per month is lower for participant women-headed households than similar men-headed households (Ksh. 4,700 compared to Ksh. 6,700). However, among controls consumption is higher for

**Table 30: Distribution of Respondent Households by Monthly Consumption Expenditure per Capita**

	Participant	Control	Total
BASE: Total Sample	1,024	923	1,947
None	1	1	1
1,000 and below	23	21	22
1,001 and 2,000	15	19	17
2,001 and 3,000	10	10	10
3,001 and 4,000	7	10	9
4,001 and 5,000	7	8	7
5,001 and 6,000	7	5	6
6,001 and 7,000	4	4	4
7,001 and 8,000	3	4	3
8,001 and 9,000	3	3	3
9,001 and 10,000	1	2	2
10,001 and 15,000	9	7	8
15,001 and 20,000	4	2	3
20,001 and 50,000	5	2	4
50,000+	1	1	1
Total	100	100	100

Women comprise 24 percent of the farmers in the sample but head only ten percent of the households – 12 percent in the test sample and eight percent in the control sample. The largest share of women-headed households, 19 percent, is among avocado producers in Central province (Table 35).

As a point of comparison, Kenya's 1997 Welfare Monitoring Survey (Government of Kenya, 2000) found a significantly higher proportion of women-headed households in rural areas of Kenya – overall, 31.2 percent of poor rural households and 25.5 percent of non-poor rural households included in this survey were headed by women. The proportion of poor rural households headed by women in Eastern province was 33.6 per-

**Table 31: Distribution of Respondent Households by Asset Score**

	PARTICIPANT	CONTROL	TOTAL
BASE: Total Sample	1,024	923	1,947
1 (Lowest)	5	10	8
2	13	17	15
3	18	14	16
4	13	14	14
5	10	10	10
6	13	14	13
7	14	12	13
8 (Highest)	14	9	12
Total	100	100	100
Mean	4.7	4.3	4.5

women- than for men-headed households (Ksh 7,800 compared to Ksh 4,900). This suggests that the woman-headed households reached by the projects are poorer. A higher proportion of women-headed households is below the Ksh 2,000/day consumption figure, but the difference is slight (42 percent compared to 40 percent) and may not be significant. A larger proportion of women- compared to men-headed households is in the lowest asset group (13 percent of woman-headed households compared to six percent of man-headed households), indicating their greater vulnerability. This gender gap is larger among controls than participants. There is little difference between women- and men-headed households in the proportion of households in the top asset category.

**f. Differences by Socio-economic Status**  
Earner-dependent ratios, average number of income sources, and the

the top asset category. The proportion of households with per capita expenditures less than Ksh.2,000 per month is highest for the bottom two wealth groups (68 percent and 53 percent respectively).

#### g. Intra-household Issues

A number of intra-household factors can affect the supply response of farmers in the tree fruit value chain and pro-

vide a context for understanding impacts. Within households, who assumes responsibility for doing the work, who makes management decisions, and who controls the earnings can all influence decisions regarding the investment of time and resources in tree fruits. The tree fruit value chain is characterized by a gender differences in all these areas.

Passion fruit is mostly a woman's crop and women make most of the decisions regarding production and sale. Men decide on the initial investment; but women make most other decisions. They also do most of the work. Men dig holes for the plants and install the poles and wire (one-off tasks) while women maintain the vines, harvest the fruit, and play a key role in sales to brokers. Men play a role in selling to exporters. Women sometimes hire male labor for picking, although they often face labor shortages, especially during the harvest season for other crops. Women's "ownership" of passion fruit is reflected in the comment of a farmer in Eldoret who accused a man of "stealing his wife's fruit and selling it for drink". Women are the first to receive income

importance of tree fruit income within households are similar across wealth levels (Table 37). However, as expected, consumption expenditures increase with wealth level. Average monthly per capita consumption expenditure rises steadily from Ksh.3,000 for households in the bottom asset category, to Ksh.11,200 for households in

**Table 32: Distribution of Respondent Households by Asset Score and Intervention**

	EAGA			SITE			KADI			Fintrac HDC			Just Juice		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
BASE: Total Sample	250	250	500	350	349	699	70	0	70	206	173	379	148	151	299
1	9	28	19	6	6	6	11	0	11	0	2	1	1	1	1
2	23	28	25	15	15	15	14	0	14	4	9	6	5	11	8
3	17	17	17	26	17	21	11	0	11	10	8	9	15	11	13
4	12	8	10	14	17	16	20	0	20	13	13	13	13	15	14
5	12	6	9	9	13	11	4	0	4	11	9	10	14	11	12
6	10	7	8	10	14	12	13	0	13	18	16	17	16	21	18
7	8	4	6	11	12	11	10	0	10	22	20	21	19	19	19
8	10	2	6	9	7	8	16	0	16	21	23	22	19	12	15
Total	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100
Mean	4	2.8	3.4	4.2	4.4	4.3	4.5	0	4.5	5.8	5.6	5.7	5.5	5.2	5.3

from sales to brokers, and generally control this income. According to one woman farmer, income from the passion goes to 'obvious things' like school fees and paying off loans. If there is a surplus after covering these expenses, husbands and wives jointly negotiate the use of the surplus.

For avocados, men pick and prune the trees and women do most other maintenance work. If there is a shortage of male labor within the family, women will hire male labor for picking fruit, but they also face labor shortages. Although women do most of the work cultivating avocados, group payments are in the name of their husbands or sons. Women traditionally are responsible for negotiating with brokers, so they may lose some control over avocado income in working through groups. However, when asked about decision-making, both men and women group members said that husbands and wives make decisions together about money earned from avocados.

In mango farming, men appear to play a more central role in crop management

and upgrading activities. Brokers are responsible for picking mangos (the trees are tall) and factor this into their prices. Households sometimes hire outside labor if there is excess production or they are involved in non-broker sales. Men and women make joint decisions at the farm level, and farmers say that payments [from brokers] may be received by anyone in the household, even children. Household members generally discuss ahead of time a 'floor' price they will not sell below. Once income is in household, men and women decide jointly on 'big' expenditures, while other expenditures are routine and don't require discussion. Al-

**Table 33: Distribution of Respondent Households by Size of Landholding**

	PARTICIPANT	CONTROL	TOTAL
BASE: Total Sample	1,024	923	1,947
Upto 0.5 acre	1	4	2
0.51 to 1.0 acre	11	6	9
1.1 to 2.0 acres	18	17	18
2.1 to 4.0 acres	25	21	23
4.1 to 6.0 acres	17	13	15
6.1 to 10.0 acres	12	17	14
10.1 to 20.0 acres	8	11	9
20.1 + acres	7	12	9
Total	100	100	100
Average (acres)	2.9	2.8	2.9
Standard Deviation	1.6	1.6	1.6

though women play a secondary role in mango farming in some households, they said they have a fairly good idea of how much money is coming in.

**Table 34: Distribution of Respondent Households by Size of Landholding by Intervention**

	EAGA			SITE			KADI			Fintrac HDC			Just Juice		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
BASE: Total Sample	250	250	500	350	349	699	70	0	70	206	173	379	148	151	299
Upto 0.5 acre	1	2	1	1	-	n	1	-	1	-1	-	1	5	15	11
0.51 to 1.0 acre	18	7	13	5	n	3	3	-	3	6	1	4	26	22	24
1.1 to 2.0 acres	38	36	37	10	2	6	9	-	9	13	12	12	18	25	21
2.1 to 4.0 acres	29	36	33	25	15	20	19	-	19	17	13	15	30	19	24
4.1 to 6.0 acres	8	12	10	20	13	17	34	-	34	21	17	20	13	11	12
6.1 to 10.0 acres	5	6	6	17	27	22	14	-	14	13	23	18	7	4	6
10.1 to 20.0 acres	2	n	1	12	19	16	14	-	14	14	15	14	1	2	1
20.1 + acres	-	-	-	11	23	17	6	-	6	16	17	16	-	1	n
Total	100	100	100	100	100	100	99	-	99	99	99	99	99	99	99
Average (acres)	2.6	2.8	2.7	7.3	10.8	9	6.9	0	6.9	8.1	9.1	8.6	2.7	2.5	2.6
Standard Deviation	2.4	2	2.2	6	6.4	6.4	5.3	0	5.3	6.7	6.5	6.6	2.3	3	2.7

In general, decisions to upgrade, join producer groups, and use income from tree fruits are joint decisions within families, with women and men both playing a role. Spouses discuss these decisions and generally agree together what to do. Reallocation of significant household capital and labor to tree fruits does

not appear to be a key household issue at this point, perhaps because major upgrading activities are still getting underway.

#### h. Summary of Household-level Findings

Household size in the sample is large relative to the total population, but about average

**Table 35: Percentage of Woman-headed Households in Study Sample**

	PARTICIPANT	CONTROL	TOTAL
EAGA	20	17	19
SITE	10	3	6
KADI	16	-0-	16
Fintrac HDC	9	4	7
JUST JUICE	9	8	8
TOTAL	12	8	10

involving poor households and, thus, have potential for direct impact on their income from tree fruits. The sample also includes less poor households, which should provide a good basis for comparing impacts across poverty groups at the end line.

Households are quite diversi-

**Table 36: Selected Household Data by Gender of Household Head**

	Women Headed Household			Men Headed Households			Total Households		
	Participant	Control	Total	Participant	Control	Total	Participant	Control	Total
Average no. household members	5.7	5.6	5.7	6.1	6.1	6.1	6.0	6.1	6.1
Average no. earning members	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.0
Earners dependent ratios	.37	.38	.38	.33	.33	.33	.34	.34	.34
% HH w/ salaried workers	40	33	38	43	45	44	43	44	44
% HH w/ children in school	65	68	66	78	81	79	76	80	78
Average size of landholding (acres)	5.9	6.9	6.3	9.7	13.4	11.5	9.3	12.9	11
Average no. income sources	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
% HH ranking tree fruit income #1	66	33	54	60	32	46	61	32	47
Average consumption expenditure	4,700	7,800	5,800	6,700	4,900	5,800	6,500	5,200	5,800
% HH with per capita consumption expenditure < Ksh.2000	42	42	42	39	41	40	39	41	40
% HH in lowest asset group	9	18	13	4	8	6	5	10	8
% HH in highest asset group	12	10	11	14	9	12	14	9	12

relative to poor rural households. The number of earning members in households and the number of household income sources suggest an active working population among respondents. There are no major differences in earners dependent ratios between men and women headed households or wealth level (as indicated by asset scores) sug-

gesting this may not be a major determinant of vulnerability for households in the sample.

The asset scores and consumption expenditure data show a significant number of poor households in the sample, in both the participant and control groups. This suggests the projects are

fied in their sources of income and tree fruits are an important source. While these figures may reflect an upward bias in some respondents who associated the study with the tree fruit projects, it suggests the importance of relatively small



amounts of cash income for rural households.<sup>33</sup>

Gender differences in the division of labor related to tree fruit production, the control of tree fruit income, and access to productive resources are likely to play out in the impact of the projects. Producer groups appear to be an effective means of reaching women and poorer tree fruit farmers.

**Table 37: Selected household data by asset score group (total sample)**

	1	2	3	4	5	6	7	8	Overall Mean
Average earner/dependent ratios	.32	.34	.37	.35	.33	.32	.32	.34	.34
Average number income sources	3.3	3.5	3.5	3.5	3.6	3.8	3.8	4.2	3.6
% HH ranking tree fruit #1 source of income	57	50	46	41	49	46	45	50	47
% HH income from tree fruits (average)	41.8	41.0	39.5	36.6	41.9	37.8	37.2	40.5	39.4
Average monthly per capita consumption expenditure (Ksh)	3,000	3,300	5,300	4,700	4,900	6,700	7,400	11,200	5,800
% HH with monthly per capita consumption <Ksh2,000/mo	68	53	48	41	37	33	24	22	40

<sup>33</sup> The survey teams were careful NOT to tell those interviewed that the study concerned the impact of the tree fruit projects. However, given the number of questions about tree fruit, it would be natural for respondents to associate the study with the USAID projects, which are relatively high profile.

## IV. CONCLUSIONS OF THE BASELINE STUDY AND IMPLICATIONS FOR ROUND TWO OF THE IMPACT ASSESSMENT

This impact assessment is designed to test the hypotheses enunciated on pages 16-18, above. The general hypothesis is that the activities of the Kenya BDS and Fintrac HDC projects can be effective in opening up opportunities for smallholder MSEs in local, regional, and global markets and in improving the competitiveness of Kenya's tree fruit value chains. More specifically, the impact assessment hopes to identify and measure improvements that lead to greater integration of smallholder MSEs into the value chain, to improved enterprise performance and household well-being, and to improved competitiveness and growth of the targeted value chains.

The study is longitudinal and has two stages. This report covers the first, or baseline, stage. It examines the condition of the value chain and a sample of smallholders and others involved in the production and marketing of tree fruit at an early stage of implementation of the two projects. The main purpose of the baseline study has been to establish a standard against which change can be measured two years later.

Broadly speaking, the baseline research shows that smallholders are part of the tree fruit value chain, but they occupy a low position within that chain. They are numerous and active producers, but their productivity is low and they sell much of their produce under unfavorable conditions. Income from tree fruits plays an important role as a source of household income, especially for the poorer farmers, but income from tree fruit and total household income are both very low in most cases.

To varying degrees, the five interventions included in the baseline study succeed in reaching low-income farmers.

This means that there is potential for direct impact by raising their incomes through the projects.

Producer groups are an important part of this potential because they provide horizontal linkages that give poor farmers a chance to link to export markets – something they have very little opportunity to do by other means. The projects have been instrumental in organizing and strengthening tree fruit producer groups.

Vertical links to higher-value markets provide critical incentives for tree fruit producers to upgrade. So far, only one of the interventions studied – the EAGA avocado intervention – has begun to realize this potential by forging a direct link from farmers to the European market. This has required considerable 'hand holding' by Kenya BDS and has involved an exporter that has received other support from USAID to help prepare smallholders to meet EUREPGAP standards.

Brokers remain alive and well in all three fruit value chains and continue to be important marketing channels for many farmers.

It is too soon to tell whether the project activities will result in "sustainable solutions" to the recurrent needs of tree fruit producers. This includes both embedded and stand-alone solutions/services that provide inputs, TA, or market access. In some cases changes might take place due to direct provision by the projects but it remains to be seen if embedded service arrangements, the commercialization of nursery and extension services, or the "network broker" concept of EAGA and Kenya BDS will last once the project activities end.

Annex B (below) provides a checklist of issues that should be addressed in the follow-up survey. A general point is that while scrupulous efforts were made to select control group samples for the baseline survey that were comparable to the participant samples, the findings cited in this report show that at the time of the survey the participants as a group were significantly better-off and more productive -- in many cases and in several ways -- than the controls. When each group is resurveyed two years hence, care will need to be taken in analyzing the results to ensure that differences in household wealth and other mediating variables are taken into account in determining the impact of the programs.

In the second round it will be crucial to include a careful review and documentation of the interventions – that is, the project facilitation activities of Kenya BDS and Fintrac HDC as well as the specific sub-project activities. One reason for this is that the activities are very different, making it important to be clear about what we are comparing. Another reason is that the scopes of the activities and the approaches they take are likely to evolve over time. Finally, it will be important to provide a close analysis of the commercialization issue, including a careful look at the specific services/solutions undertaken during the course of the projects. Time for these activities should be included in the budget for the second-round assessment. Provision should also be made for reviewing the monitoring data that are being collected by both projects.

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## ANNEX A. DESCRIPTION OF KENYA BDS AND FINTRAC HDC PROJECT ACTIVITIES

KENYA BDS				
Value chain	Type of activity	Geographic area Partner	Target group	Participation variables
Avocados	<p>Form producer groups to engage in forward and backward linkages</p> <p>Facilitate improved provision of inputs (agrochemicals and seedlings), equipment, and extension services in crop husbandry through embedded service arrangement with lead firm</p> <p>Facilitate the establish of collection sites in collaboration with producers and buyers</p> <p>Facilitate improved transport of goods to Nairobi</p>	<p>Central province</p> <p><i>EAGA</i></p>	<p>Small holder avocado farmers</p> <p>Lead firm providing contracts to producers and embedded services</p>	<p>Smallholders who used embedded service</p> <p>Smallholders selling avocados to EAGA</p> <p>EAGA</p>
Mangos	<p>Form producer groups to engage in forward and backward linkages</p> <p>Link producer groups to existing commercial providers of extension services</p> <p>Facilitate market linkages between producer groups and multiple buyers</p>	<p>Eastern and Central province (Machakos, Makueni, Murang'a districts)</p> <p><i>SITE</i></p>	<p>Small holder mango producers</p> <p>Buyers</p> <p>Business service providers (Private extension agents)</p>	<p>Smallholders who join producer groups</p> <p>Smallholders who use extension services</p> <p>Smallholders who sell to buyers ID's by SITE</p>
Mangos	<p>Provide on-farm training of trainers for unemployed extension officers</p> <p>Creation of Farmer Led Extension Teams (made up of lead farmers and extension agents) to provide commercially viable extension services</p> <p>Launch information campaign to increase awareness of value of extension services</p> <p>Establish revolving fund to finance adoption of good agricultural practices</p>	<p>Coast Province (Lamu and Tana River districts)</p> <p><i>Coastal Development Authority (CDA)</i></p>	<p>Small holder mango producers</p> <p>Business service providers (farmer led extension teams; financial services)</p>	<p>Private extension officers who participate in training</p> <p>Extension agents/lead farmers who join FLET</p> <p>Farmers who access finance through revolving fund</p>



KENYA BDS				
Value chain	Type of activity	Geographic area Partner	Target group	Participation variables
Mangos	<p>Form producer groups to engage in forward and backward linkages</p> <p>Facilitate market linkage to buyers</p> <p>Develop market information data base</p> <p>Facilitate brokerage work-shops</p> <p>Train private extension workers mango husbandry and business management</p> <p>Information campaign to sensitize producer groups to value of extension services</p>	<p>Coast province Watamu/Msabaha region, Malindi</p> <p>Kenya Gatsby Trust, KARI, KWETU</p>	<p>Small holder mango producers</p> <p>Extension service providers (private extension agents)</p>	<p>Smallholders who join producer groups</p> <p>Extension workers who participate in training</p> <p>Buyers who participate in brokerage work-shops</p>
Mangos	<p>Information campaign to sensitize farmers on nursery development and benefits of nursery seedlings</p> <p>Train nursery operators in mango husbandry and business management</p> <p>Train extension service providers on grafting, budding, top working</p>	<p>Eastern Province Mbeere and Machakos districts</p> <p><i>KADI - Catholic Dioceses of Embu</i></p>	<p>Small holder mango producers</p> <p>Input suppliers (seedling suppliers, extension services)</p>	<p>Nursery operators who participate in training</p> <p>Service providers who participate in technical training</p>
Passion fruit Mangos	<p>Form producer groups to engage in forward and backward linkages</p> <p>Facilitate market linkage to Greenlands</p> <p>Facilitate the establishment of a private passion fruit nursery (including backward linkages with farmers)</p>	<p>Eastern province (Embu and Meru districts)</p> <p><b>Just Juice, KARI, KMEPP Greenlands Ag-producers LTd</b></p>	<p>Small holder passion fruit farmers</p> <p>Buyers</p>	<p><i>Small holders in producer groups</i></p> <p>Small holders selling to market outlets</p> <p>Buyers</p>
Tree fruits (general)	<p>Develop a system for collecting and posting market information on electronic data base</p> <p>Build awareness of availability and use of ICT for market information</p>	<p>Karatina, Murang'a Embu</p> <p><i>KACE</i></p>	<p>Small holder tree fruit producers</p> <p>Buyers</p> <p>Business ser-</p>	<p>Small holder who participate in SMS training</p> <p>Small holders who request market information</p>

KENYA BDS				
Value chain	Type of activity	Geographic area Partner	Target group	Participation variables
	Train farmers on use of SMS  Establish three rural trading floors/market information points		vice providers (market information services)	Small holders who made a bid Buyers who use market information Entrepreneurs who purchased a franchise
Tree fruits (general)	Train agrochemical stockists in advisory services related to proper storage, labeling, transport, handling, repacking, and adulteration  Train agrochemical stockists in business management  Raise awareness of rural farmers on safe application of agrochemicals  Establish credit facility link between agrochemical distributors and stockists  Develop monitoring system to inform manufacturers and stockists on consumer trends	Eastern and Central province  Ideal Business Link, Ltd.	Input suppliers (stockists who can provide technical advice to their MSE clients)	Stockists who participate in training Stockists who access credit facility Agrochemical distributors who sell to stockists

FINTRAC HORTICULTURE DEVELOPMENT CENTER				
Value chain	Type of activity	Geographic area Partner	Target group	Participation variables
Passion Fruit	Establish 30-40 demonstration plots and offer training in:  Grafting techniques Planting techniques Seedling production Pruning techniques Disease management New products (Jumbo passion fruit)	Central, Western, and Rift Provinces  KARI	Smallholders and smallholder associations currently or with potential for growing passion fruit Private nurseries	Smallholders attending the training Associations with demonstration plots
Passion fruit	Development of commercial nurseries	Central, Western, and Rift Provinces		Commercial nursery operators

FINTRAC HORTICULTURE DEVELOPMENT CENTER				
Value chain	Type of activity	Geographic area Partner	Target group	Participation variables
				Smallholders purchasing products from nurseries
Passion fruit	Search for investor in passion fruit processing plant (to buy up passion fruit produced by small- holders)	Central, Western, and Rift Provinces		

## ANNEX B: ISSUES TO FOLLOW UP IN ROUND TWO

### Avocado

- Whether avocado production increases and quality improves
- In terms of trust between growers and EAGA – whether MOUs are worked out; whether agreements are abided by
- In terms of dynamics of participation of the poor: Whether smaller scale growers are included in or left out of groups
- Whether those left out benefit through spin offs -- increased market demand, increased prices, and increased employment
- Exporter preference for dealing with groups vs. brokers vs. smaller number of larger growers
- Whether Kenyan avocados become more competitive in export markets
- For exporters, whether the shift from spot markets to retail markets continues to benefit the industry
- Whether the avocado oil processing plant opens and the extent to which it promotes increased production and increased income
- Whether the groups continue and relationship between groups and EAGA continues as KBDS pulls out
- Whether other exporters enter into the avocado value chain and offer competition to EAGA
- Whether the model of direct links between exporters and producer groups – marketing links and embedded services – is expanded by EAGA with Avocado and other horticulture; whether it is replicated by other exporters working with smallholders involved in the avocado or other horticulture value chains.
- Whether groups and group members expand their activities into other export crops (and link to exporters through group mechanisms) [intersectoral upgrading].
- Whether brokers continue to play a role in value chain and, if so, what it is
- How mobile phones are used for marketing purposes
- Whether greater levels of trust develop between smallholders and exporters
- The extent to which cell phones are used to improve information flows within the value chain.

### Mango

- Whether direct market links to exporters can be established
- Whether some system for providing embedded services (inputs) evolves
- Whether farmers expand production, introduce new varieties, improve quality
- Whether collection points for mangos are established and used
- Whether smaller growers continue to participate in groups and benefit; or large farmers dominate
- Whether some kind of mango processing factory is established and how this impacts mango production and farmer incomes
- Whether Kenyan mangos become more competitive in export markets
- How cell phones effect relations with brokers/marketing links; the extent to which they promote direct market links for farmers
- What other role the farmer groups play in helping farmers
- The extent to which cell phones are used to improve information flows within the value chain.

### *Passion fruit*

- Whether farmers continue to plant and harvest passion fruit
- Whether grafted seedlings become more available and are adopted by growers
- Whether vibrant (albeit seasonal) Uganda market continues
- Whether processing plant established and if so how this affects production volumes and farmer incomes

- Whether Kenyan Passion fruit stays competitive – or becomes more competitive -- in export markets
- How passion fruit piggy backs on to other export crops (or how other horticulture crops piggy back on passion)
- The extent to which cell phones are used to improve information flows within the value chain.

### **Cross cutting issues**

- Assessment of the types of activities in which they are involved and the extent/degree of management responsibility that the group assumes for particular activities vis-à-vis other value chain actors.



## ANNEX C: CALCULATION OF THE ASSET SCORE GROUPINGS

1. The following attributes were selected to indicate a household's standard of living:

- Whether farm land owned or rented
- Size of land holding
- Material of house wall
- Roofing material
- Presence of a two-story house
- Presence of a domestic worker
- Number of tables
- Source of drinking water
- Agricultural assets owned
- Cooking arrangements
- Presence of deep freeze
- Consumer durables owned
- Vehicles owned
- Toilet arrangements
- Main floor material of the house
- Number of fruit trees

The philosophy guiding this procedure is that no single question or answer on its own can adequately summarize a reality as complex as standard of living. Hence, many variables were used in conjunction with each other to contribute to the discovery of a single measure of standard of living.

2. The attributes listed above were then factorized into a single factor using SPSS to find a single unifying theme. The output of this factorization was that each respondent received a single factor score based on his/her responses to questions about ALL the listed attributes. Each respondent's factor score describes the respondent's relationship to the extracted theme. Thus the respondents' factor scores form a continuum from the lowest value to the highest value.

This factor is a measure of the overall living standard of an individual. Factor analysis is the best mathematical tool available for summarizing a complex reality. While every variable used contributes to the overall factor, the fact that many are used means that the overall dimension is unlikely to be a reflection of one item only; rather, the factor is a summarized version of the single reality underlying different response patterns and levels in the constituent measures. This is precisely what we are looking for as a measure of living standard.

The continuum of values was then cut into eight roughly equal groups, one being the group with the lowest values and eight being the group with the highest values. The eight groups are not exactly equal in size because we wanted to achieve a good spread of each farmer group across several asset score groups. The factor was then cross-tabulated against attributes that were outside those listed above to determine whether the theme described by the single factor really was a measure of living standard. The theme described by the single factor did correlate with the distributions of these other, unused validation variables (and this is reflected wherever we see the asset score cited in the report) and thus the factor was deemed suitable to describe the standard of living.

3. Following this process, a smaller "predictor" set of attributes was identified. The reason for the predictor questionnaire is to avoid having to ask all the same questions in the follow-up survey, thus reducing the time that will have to be spent in the field. To arrive at a short set of attributes that would predict the

original factor, we did a step-wise regression, which means we took the factor that was created and made it a dependent variable, and looked for the attributes from the entire set that best predict the original factor. Step-wise regression is a technique that cycles through all the attributes supplied and creates models of prediction using first one, then two, then three variables and so on until all the supplied variables are used. From these models, one was selected that gave a sufficiently accurate prediction of the factor value while consisting of the maximum number of questions that we judged to be possible to include in future surveys.

4. Because the predictor scores do not match the factor scores exactly (although they are extremely close), it follows that the “predictor” groups cannot be exactly the same as the original “factor” groups. Thus, the data were run again using the predictor attributes, and this is what is then used in analysis for this round of the survey and will be used again in the next round to ensure comparability between the two rounds. These are the asset score groupings that are shown in this report.